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ABSTRACT

This report summarizes a conference of thirty minority women in science, engineering, medicine, and dentistry that was held in December 1975, with the support of the National Science Foundation. In addition to a general discussion of the conference and the conferees, the following topics are discussed with respect to the experiences of the minority women scientists: the precollegiate experience, collegiate and professional education, career experience, the diversity of race and culture, and recommendations, programs, and conclusions. (MH)

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AAAS Office of Opportunities in Science

The Double Bind: The Price of Being a Minority Woman in Science

Shirley Mahaley Malcom
Paula Quick Hall
Janet Welsh Brown

American Association for the Advancement of Science
1515 Massachusetts Avenue, N.W., Washington, D. C. 20005

AAAS Report No. 76-R-3, April 1976

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AAAS OFFICE OF OPPORTUNITIES IN SCIENCE

THE MAJOR PURPOSES OF THE OOS ARE:

* to increase the number of minorities, women and the handicapped in the natural, social and applied sciences;

* to increase the kinds of opportunities available to these groups;

* to increase the participation of minority, women and handicapped scientists and engineers in policy-making, advisory and managerial positions.

TO FULFILL THESE PURPOSES, the OOS is involved in many programs and activities. It functions as a *clearinghouse* on information con-concerning women, minorities and the handicapped; it acts as *liason with other professional organizations* to help coordinate equal opportunity efforts; it works with the *Scientific Manpower Commission* on problems dealing with the recruitment, education and utilization of women, minority and handicapped scientists; and *within the AAAS* it encourages the increased participation of these groups and the consideration of issues concerning them in all programs and activities of the Association.

UNDER THE GUIDANCE OF ITS ADVISORY COMMITTEE AND PANELS, the Office has developed numerous programs to implement its objectives. *Science Education for Minorities: A Bibliography* is an inventory of projects undertaken since 1960 which have been aimed at improving the quality of science education for minority students. The *"Conference of Minorities in Science"*, held as part of the AAAS Annual Meeting in Boston, February 19-21, 1976, assessed this country's efforts to bring about an adequate representation of minorities in the sciences. Proceedings will be published. The *Project on Native Americans in Science* is investigating the problems and developing strategies for improving the science education and opportunities available to Native Americans. It is also developing programs on ethnoscience and ethnomedicine, and on altering the attitudes of the general public and educators that are detrimental to Native American progress in technical fields. The *Project on the Handicapped in Science* seeks to improve the status and participation of handicapped scientists and to improve science education available to handicapped youth. One activity is to make professional meetings completely accessible to the physically disabled, as it recently did with the AAAS Annual Meeting. *Rosters of Minority and Women Professionals*, published in 1975, is an assessment of the uses and benefits of rosters as tools to achieve equal opportunity.

The OOS welcomes ideas, suggestions and help from all who are interested.

JUL 28 1976

THE DOUBLE BIND:
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MINORITY WOMAN IN SCIENCE

Report of a Conference
of
Minority Women Scientists
Airlie House, Warrenton, Virginia

by

Shirley Mahaley Malcom
Paula Quick Hall
Janet Welsh Brown

American Association for the Advancement of Science
1515 Massachusetts Avenue, NW
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TABLE OF CONTENTS

Acknowledgements v

PREFACE vii

FOREWORD ix

CHAPTER I MINORITY WOMEN IN SCIENCE 1
- The Double Bind: The Price of Being a Minority Woman Scientist 2
- The Conferees 4
- Conference Organization 4

CHAPTER II THE PRECOLLEGIATE EXPERIENCE 6
- Family Relationships 6
- Schools 7
- Other Societal Influences 10
- Implications and Recommendations 11
  - To the Mass Media 11
  - To School Systems 12
  - To Scientific Societies and Community Groups 14
  - To Policymakers 14

CHAPTER III COLLEGIATE AND PROFESSIONAL EDUCATION 15
- Academic Factors 15
- Social and Personal Factors 17
- Implications and Recommendations 19
  - To Academe 19
  - To Scientific Societies 20
  - To Public and Private Funding Agencies 21

CHAPTER IV CAREER AND PROFESSIONAL EXPERIENCE 22
- Getting a Job 22
- The Work Experience 24
- Male/Female Relations and Family Factors 27
- Implications and Recommendations 28
  - To Employers 28
  - To Scientific Societies 29
  - To Policy Makers 30
  - To Funding Agencies 30

CHAPTER V THE DIVERSITY OF RACE AND CULTURE 31
- The Native American Scientists 32
- The Puerto Rican Scientists 33
- The Mexican-American Scientists 34
- The Black Scientists 35

CHAPTER VI RECOMMENDATIONS, PROGRAMS AND CONCLUSIONS 37
- Policy Recommendations 37
- Proposed Projects 38
- Conclusions 39

APPENDICES

A. MINORITY WOMEN IN SCIENCE AND ENGINEERING, a paper prepared for the Conference by Betty M. Vetter, Executive Director, Scientific Manpower Commission 41

B. PARTICIPANTS, CONFERENCE OF MINORITY WOMEN SCIENTISTS 53

C. ORGANIZATION OF THE CONFERENCE 57

D. AN ECONOMIC AND SOCIAL PROFILE OF THE CONFEREES 64

E. SELECTED RESOURCES ON MINORITY AND WOMEN SCIENTISTS, prepared for the Conference by Susan E. Posner, Staff Assistant, Office of Opportunities in Science 66

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Preface

In 1973 the AAAS Board of Directors appointed a Committee on Opportunities in Science to advise the Association on the achievement of greater representation of women and minority scientists in the affairs of the AAAS, and to help increase their numbers and improve their status in science. At the same time the Board established an Office of Opportunities whose staff was charged with working toward these objectives. Association activities in these areas have included advocacy of policy and program changes, collection and exchange of information on the status of minority and women scientists, and a special emphasis on the improvement of science education available to women and minority youth. Last year the Association added the handicapped in science to the responsibilities of the Office.

From the start, the AAAS efforts on behalf of women and minority scientists have included minority women. They have participated on every panel, conference, and committee organized by the Office, and their concerns have been included in all activities undertaken on behalf of either minorities or women. There is even a minority woman on the panel that advises the Project on the Handicapped in Science. Despite this strategy of inclusion, however, it gradually became apparent to Committee and staff members that the special problems peculiar to minority women scientists never were addressed. The minority women were, in fact, falling somewhere in between the funded efforts to improve science opportunities for minorities and efforts to advance women in science.

There was little information available on the status of minority women in science and virtually no literature that would advise institutions on the nature of the problems or the remedies. The AAAS therefore decided to arrange a small conference of the women themselves to find out exactly what the problems are, and in what respects they are similar to or different from those of majority women scientists, minority male scientists, and all other scientists. It was to define and illuminate those questions and to receive the advice of minority women scientists that the conference was held in December 1975 with support from the National Science Foundation. The immediate and enthusiastic response of minority women to the announcement of the conference is evidence that the meeting was long overdue.

This volume is the report on that conference. Its policy and program suggestions can serve as a guide to the public agencies, educational institutions, professional associations, and funding organizations. Perhaps its larger contribution, however, will be in helping the rest of us in science to understand more clearly and fully the situation of those who are excluded from the mainstream. As we become more aware of their perceptions we can move more readily toward equitable solutions.

William D. Carey
Executive Officer, AAAS

FOREWORD

A small but significant meeting of thirty scientists took place in December 1975. The specialness of this meeting was that for the first time in America, minority women in science, engineering, medicine and dentistry met together to discuss their unique position as the most underrepresented and probably overselected group in the scientific disciplines. These Black, Mexican-American, Native American, and Puerto Rican women were involved in various work activities--teaching, research, administration, health service delivery--and represented a wide range of disciplines, from aerospace physics to zoology. Among the group of women, for example, were a Native American psychiatrist, a mining engineer and a sophomore medical student; a Puerto Rican biology professor and a physician; a Mexican-American computer scientist; and a Black engineer, an oceonographer and a pediatrician.

Although this group of women came from the "pure" and applied sciences, with a wide range of ages and experiences and diverse backgrounds and cultures, we shared a common bond; and a special and warm sense of sisterhood sprang from this. Generation gaps did not divide us, nor did our varied vocations, nor our cultural diversity. The common ties were those of the double oppression of sex and race or ethnicity plus the third oppression in the chosen career, science. Data reveal the singular underrepresentation of minority scientists in our nation at top levels . . . the scarcity of women in scientific fields and the skewed curves for women and minorities toward disciplines outside of the sciences, i.e., education, the arts, humanities.

Science careers in the context of gender and race or ethnic bias have been a major part of our lives, setting us apart at every turn. Now we could address ourselves to the reasons for our small numbers, relatively invisibility, and exclusion from mainstream science.

Our mission at this meeting was clear. We wanted to find out how and why we had made it and others had been left behind; how our sisters had handled personal and societal problems from childhood until the present. We discovered, despite differences in minority cultures, that we as women scientists (a) read at an early age; (b) had a strong sense of self; (c) were always aware of our ethnic status; (d) remembered the encouragement of a particular teacher or friend; (e) were rarely ambivalent about school and further education; (f) were disciplined to study and (g) were aware of our sex in a positive way.

Most of us experienced strong negative influences associated with race or ethnicity as children and teenagers but felt more strongly the handicaps for women as we moved into post college training in graduate schools or later in careers.

The most important impact of this meeting was the formulation of a collective sense of our mission. We outlined a blueprint for change. We identified the forces that serve to undermine our pursuit of careers in science and select out capable potential scientists. We understand the important steps to pursue in the next decade. The contributions we make individually can serve to reinforce our plans, and collectively we send this message to the scientific world and to rising women scientists.

We hope that this report will be useful to a wide variety of readers. If read and internalized by policy makers, educators and employers, its message and recommendations could reverse present trends. Most of the negative experience dealt to minority women is unconscious. A careful reading of this book can make you aware. That is the first step. Then, corrective measures, both policy and programs, can change the situation for minority women in science.

Jewel Plummer Cobb
Chairperson of the Conference
Member of the National Science Board
Advisor to AAAS

CHAPTER I

MINORITY WOMEN IN SCIENCE

Minority women represent a disturbingly small part of the total scientific manpower pool,* but are a significant component whose needs seem not to have been addressed by existing programs for minorities or women. They have traditionally been excluded because of biases related to both their race or ethnicity and gender, constituting a double bind. Programs for minorities and women have generally been assumed to include minority women, but in fact minority women fall in the cracks between the two. The programs designed to increase the number of women in science have been largely devoted to assisting majority women. The programs developed for minorities in science have mostly been dominated by male scientists. Similarly, the women's science organizations are overwhelmingly white, and the minority science organizations, overwhelmingly male.

When it became apparent that minority women were not participating fully in either kind of program, it was decided to organize a meeting of minority women scientists, to seek their analysis of their situation and recommendations for programs to increase their numbers and improve their status in science. Minority women scientists had never before met together and they greeted announcement of the conference with great enthusiasm. Jewel Plummer Cobb, member of the National Science Board and advisor to the American Association for the Advancement of Science, chaired the two day meeting in December 1975. The conference was organized by the AAAS Office of Opportunities in Science and supported by the National Science Foundation. This monograph summarizes the findings and recommendations of the conference.

The thirty conferees were drawn from a larger pool of almost two hundred minority women scientists nominated by their colleagues.** These Black, Mexican-American, Native American and Puerto Rican women represented various fields of science, engineering and medicine, as well as a variety of educational and work experiences, geographical areas and generations. Distinguished in their respective fields, they had overcome many obstacles in their attempts to obtain education and employment in science. Despite the fact that they personally had been able to surmount monumental barriers, the conferees expressed concern for the hundreds of thousands of minority group members, especially minority women, who have been excluded or systematically "tracked" out of the pool of potential scientific and technological humanpower.

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*See Appendix A.

**The conferees are listed in Appendix B, and the conference organization and method of selection described in Appendix C.

The Double Bind: The Price of Being a Minority Woman Scientist

The price of becoming a scientist, engineer or biomedical professional is very high. The financial and personnel resources of the nation that are involved in the production of scientists, engineers, and biomedical professionals bespeak this investment. The costs to the individuals who aspire to these fields are extremely high in terms of the economic resources, human energy and personal commitment and endurance which are required. Any scientist can probably remember instances where he or she had to decide between a few extra hours in the lab or a few more hours of sleep or maybe a movie. The pursuit of careers in science, engineering and biomedicine is not easily fit into the confines of a nine-to-five day or five day week.

The price of being a scientist, engineer or biomedical professional are also high. Numerous studies point out the personal sacrifices that scientists make and the kind of life that is assumed to go with the profession. Babies that do not wait to be born, computers that "crash" at 3 A.M., site visits that require extended periods of time away from family are not unheard of for many of these professionals. The additional costs to the family of scientists often go unrecognized.* All is not cost, however. Much is benefit, as any scientist would be quick to point out, but personal fulfillment does not erase what must be traded off.

The already high price of a professional science career is raised significantly by any additional obstacle, e.g., physical disability, poverty or prejudice of any kind. Because of the history of racial discrimination in the United States, a history which does not exclude the scientific community, the price of a career in science is very high for members of minority groups. The attitudinal, financial, and cultural barriers to full participation in science by Black, Mexican-American, Native American and Puerto Rican citizens have not been removed, and this is reflected by the small number of members of these racial and ethnic groups in the scientific workforce.

The traditional male domination of the science fields has made the attainment of and participation in science careers for women difficult at best. The price of a professional science career is therefore significantly higher for a woman. The demands on women to assume family-related responsibilities are not thought to be compatible with study for or work in these traditionally male professions. The mode of academic preparation and work-style have been developed around traditional majority male lifestyles which differ substantially from the varied life patterns of women. Role stereotyping and sex discrimination add to the personal costs of women who seek to fulfill career goals as scientists, engineers or biomedical professionals.

There seems therefore to be a range of costs to the individual in the attainment of a professional science career. The more an individual resembles the "typical scientist" the lower are *his* costs. Each factor of deviation from the norm raises the costs so that, as a group, minority women must pay a tremendous price for a career in science. This "differentness" of the minority woman in science may not only be a factor in the scientific community but also in the context of her culture. The tremendous personal cost that results from the combined effect of being a scientist, a woman and a member of a minority racial or ethnic group was frequently alluded to in the conference discussions. The toll of foregone social and personal activity, highly valued in traditionally defined cultural roles, was for many severe. The scarcity of companions of their own racial or ethnic group and gender, progressively greater as the degree of specialization in science increased, was a source of isolation and loneliness. Majority males and, to a lesser degree, females are not required to bear this burden. The feeling of differentness, which for most of the conferees, began to develop as early as their interest in science, was reinforced continually by the recurrent experience of being the only member of their own, or any, minority group, and/or the only woman in so many situations.

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*I.I. Mitroff, T. Jacob and E. T. Moore, "On the Shoulders of the Spouses of Scientists", University of Pittsburgh, 1975.

Most of the conferees would probably not describe themselves as feminists although they are all actively concerned about the issues which are labelled the issues of the women's movement. This seeming contradiction in terms is more than semantic, however. Most of these women scientists ally themselves primarily with the elimination of the racism faced by all members of their racial or ethnic group. The problems faced by all women are clearly important to these women also, but for most seem usually to command second priority.

The reasons for this choice are several and not easily understood. For many minority women the women's movement is seen as a movement of middle and upper class white women which does not specifically address itself to the concerns and issues faced by minority women. Some also see the bias which most acutely affects the progress of their people as that of racism which strikes early in the lives of minority group members to limit their potential advancement. From this perspective, it becomes necessary to deal with first things first.

All of the conferees had encountered sexism in one form or another and recognized it as such. They had all experienced instances where they were treated differently from male professionals, even minority males. They had encountered sexism from minority males as well and recognized it as such.

The minority women scientists attending the conference, along with many others who communicated their experience to the conference organizers,* perceived that their earlier experiences with racism were superseded by problems of sexism as they progressed through graduate and professional education and the working world. It must be noted that several instances were recalled which could have been brought about by race or gender bias or both. When this situation arises it becomes difficult if not impossible to determine which "ism" is in force. In such a case, it does not matter whether one is being hit with the club of sexism or racism--they both hurt. And this is the nature and the essence of the double bind.

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*See Appendix C.

The minority woman scientist is caught in the middle of a difficult situation. She is often being pulled from both sides by women's groups and minority organizations. If she affilitates with both, they can place a tremendous demand on her time. However, she is all too often asked to align herself with one or the other group. In neither instance is she treated as a whole person with some of the same problems as her women and minority male counterparts, as well as some unique ones.

Minority males and majority females must come to realize that a demand for the minority woman to make a choice places her in an untenable position since she can deny neither the fact of her race or ethnic identity nor her gender. Nor can she avoid the problems associated with both.

The Conferees

The conferees were chosen to represent as wide a variety of backgrounds and experience as possible in thirty individuals.* Conference organizers sought to include four racial and ethnic groups, the physical and biological sciences, mathematics, and those applied sciences, engineering and medicine, that require extensive training in the natural sciences. They sought participants with different educational and employment experiences.** Despite the considerable range of difference among them, the conferees held many perceptions and experiences in common. They shared similar experiences of discrimination due to sex and race or ethnicity. It became rapidly apparent to conference staff that they were an extraordinary group of women whose intelligence, resilience, self-confidence and perserverence were highly unusual. They themselves, however, tended to underestimate their accomplishments as well as the obstacles they had encountered. They credited "chance" and "luck" for much of their accomplishment, belying the hard work and determination actually involved.

The conferees are first of all working professionals--scientists, engineers and physicians. Throughout the conference they articulated their concern about science policy, the state of scientific research, science education, the public understanding of science, that is, the concerns of scientists regardless of race, ethnicity or gender. Conserving of their time and energies, they tackled the subject matter of the conference with directness and efficiency. The result was a highly productive meeting whose conclusions and recommendations are described in the following report.

Conference Organization

A preconference inquiry of the participants and all other nominees established the questions to be put before the conference.*** On the basis of information received from more than eighty minority women scientists, the agenda was organized in a chronological fashion with sessions devoted to pre-collegiate experience, college and graduate or professional experience, and the women's situation on the job. A fourth session was devoted to meetings of each of the separate racial or ethnic groups so that they could analyze the general findings from still another point of view. At a final session the conferees drew up recommendations for both policy and programs.

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*See Appendix C for details.

**The social and professional backgrounds of the participants is detailed in Appendix D.

***See Appendix C for details.

The chapters that follow are arranged in the same order, with pertinent recommendations associated with each phase. The recommendations are those of the conferees, but the interpretive text is the sole responsibility of the authors who have summarized the similarities and differences from conference records with assistance from the rapporteurs.

CHAPTER II

THE PRECOLLEGIATE EXPERIENCE

The first sessions of the conference examined the precollegiate period in the lives of the minority women scientists. This topic covered pre-school experiences as well as family, community and social influences during elementary and secondary school years. Discussants were asked to recall the characteristics of the schools they attended: private vs. public, urban vs. rural, boarding, coed, large vs. small, racially and ethnically integrated or segregated with respect to both student body and faculty. They were asked about science curriculum at all levels, and their grades in science and other courses. Conferees discussed the roles of others in the development of their interest in science and identified those who were most supportive, as well as those who discouraged their inclination. Of particular interest were the attitudes of teachers and counselors. The minority women scientists were asked to recall role models if they were present, and to identify positive and negative socio-cultural factors and attitudes that affected their interest in science.

The problems identified by the conferees in this period of their lives were largely due to race or ethnicity and/or poverty. It was generally at the level of graduate or professional education that the problems of being female were first recognized.

Family Relationships*

Many of the family characteristics outlined in this section cannot be generalized to all minority women scientists; neither would it be appropriate to imply that they are necessarily peculiar to this group only. It is the added factors of being both a member of a minority group and a woman which give a different perspective to those characteristics which minority women might share with other scientists.

In the families of most conference participants, there was generalized support and caring for one another. Education was typically highly valued as a means of improving one's status and economic condition or as a tool for achieving independence. As a result of parents' knowledge that their daughters would face tremendous hardship because of their minority status even when educated, great urgency was placed on the academic pursuits of the conferees. For most of these families there were not the alternative avenues of aid to success such as the family business, the successful friend, the rich uncle, and/or the family name that exist in many majority families of comparable income. It was assumed in most cases that the women would work outside the home. In most families at least one parent pushed or at least encouraged the student. Despite limited financial resources, there was no question in most cases of whether or not one would go to college, but only the question of where and how. It was assumed in most families that extreme sacrifices would be made if necessary. There were exceptions, as in the case of one Mexican-American woman who began school at the age of nine when her family moved near a town so that her six-year-old brother could attend school, and the Native American conferee whose mother urged her to marry early and have children.

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*In the experience of these minority women, "family" is not limited to the nuclear family, but often includes grandparents, aunts, uncles, cousins, half brothers and sisters, and even close friends.

While many of their homes did not have "proper" reading materials for children, most of the women recalled having had access to and learning from literature of some kind, such as old newspapers, and magazines like True Confessions or whatever was available during their youth. Their interest and activities from an early age demonstrated a general intellectual curiosity. One conferee remembered taking apart a doll because she was more interested in the mechanical "crying" device inside than in playing "mother". Many of the conferees had similar memories of their own childhood.

Although there was usually general support at home for their academic pursuits, most conferees reported some lack of understanding or acceptance of their particular interest in science. Because of the lack of familiarity with science as a discipline or with individual scientists, it was most difficult for the parents of many of these women to thoroughly comprehend their interest in science. Many parents simply did not understand what their daughters wanted to be or do. Careers non-traditional for women and/or minorities were typically viewed by families as incompatible with normal "feminine" behavior and roles. The absence of minority female role models had contributed to the perpetuation of societal stereotypes and resulted in a prejudice against science careers for minority women. However, several conferees reported parental encouragement of their interest in science. These included women from cultures where machismo is a factor who recalled that it was their fathers who had encouraged their interest in science.

Among the conferees there was generally the conviction that their strong sense of self-worth, instilled by community and family, and the support and encouragement of at least one family member had been very important. In families where this support was not provided, there was some important individual, often a teacher, who inspired and encouraged the student during the formative years.

Schools

The formal education of the conferees began and remained on a plane that was negative-to-neutral towards science. Most teachers reportedly conveyed an uninspiring, often negative attitude toward science. Like all too many other students, these women characterized the science they received as children in school as difficult, dull, mysterious and somehow remote from everyday concerns. Although the experience may have been the same for other students regardless of race or gender, there was a perceptual difference that these women had which was based on the level of anticipation for and prior interest in science. Each conferee recalled at least one teacher who had inspired and encouraged her, and in most cases another who had openly discouraged her interest in science.

For those whose native language was not English, the total failure by the educational system to accommodate this difference was a source of frustration and hardship. Mexican-American, Native American, and mainland Puerto Rican students were usually punished for speaking their native languages at school. Indicative of the severity of the problem is the fact that of the seventeen Spanish and Native speaking scientists who attended the conference, one Native American and one Puerto Rican woman had been classified in their early school years as mentally retarded, due to language difficulties. The prevailing sentiment of the conferees was that many of their peers had been less fortunate in escaping the constraints of schools whose administrators and faculty were insensitive to cultural differences. It was feared that students of minority racial or ethnic groups, especially those whose primary language is other than English, continue to be misplaced, misdiagnosed and mistreated in educational systems which fail to recognize, much less accommodate, language and cultural differences.

Because of the different types of schools attended by these minority women, there were qualitative differences in the nature of their pre-collegiate educational experiences. Some of the conferees attended segregated schools and were taught by members of their own race or ethnic group. These women valued highly the positive influence of teachers who typically expected much of them, seemed to have a personal interest in them, and motivated and supported their intellectual curiosity. The segregated minority schools, however, usually suffered from inadequate facilities, from the building to the books, although the students were not always aware of the differences unless or until they had exposure to other schools. It must be recognized that the academic quality was often not what one would have hoped for. There were, however, other ways in which the students were sustained and equipped to compete in the "system", especially in terms of the higher expectations of teachers and the support and encouragment they provided their students.

It was clear that the segregated schools with faculty of the students' own race or ethnic group had offered some real advantages, despite the disadvantage of inferior equipment and facilities in many instances. It should not be presumed, however, that the conferees believed that merely providing well-equipped facilities would make segregated schools an ideal learning environment. In addition to severly limiting the diversity of their experience, and denying individuals freedom of choice, such a system would create for children a totally unreal environment, incapable of adequately preparing them for adult life, especially for careers in science. On the contrary, the solution proposed by the conferees is that the racist attitudes and behaviors that prevail and impede learning in many integrated schools be eliminated. Society would, thereby, be able to provide quality education in an environment conducive to learning and intellectual growth, and in accordance with democratic principles.

Of the women who attended predominately majority or integrated schools, most perceived a competitive atmosphere and high academic standards which served to challenge them. The teachers, however, often had lower expectations of minority students, although there was usually one teacher who inspired, encouraged and challenged them. In some instances there was conflict among students of different racial or ethnic groups which made school a tense environment, less conducive to study and normal social interaction. Social isolation and a dearth of same-sex, same-race peer companionship had a marked influence on the adolescent development of most conferees who attended this type school. It was clear that by the time they finished high school these young women's interest in science had already established a pattern of differentness in their lives.

Students in schools designed for minority students but staffed by majority faculty frequently experienced a patronizing, missionary attitude on the part of teachers. Little was expected of them academically. Counseling, whether formal or unstructured, was toward the less academically demanding courses and career choices. Insensitivity and ignorance of cultural value differences on the part of teachers was another barrier to student achievement.

The Puerto Rican women reported that the quality of education they and their Puerto Rican peers received in urban ghetto schools was extremely poor. They singled out New York City since that is where their mainland experience had been. Most of these conferees had received at least part of their schooling on the island of Puerto Rico, where they enjoyed the advantages of majority group status and better education than in New York City.

The Native American women and a few of the Mexican-American women had more frequently than conferees of other groups lived in open country and attended rural schools. This experience, while not necessarily better or worse, was qualitatively different from that of urban education. There seemed also to be less adequate science instruction in such schools.

All conferees described counseling they had received as poor at best. Many conferees especially at the elementary level had received no formal counseling. The older women in the group had typically had no formal counseling at either level. In any case, career counseling had not been emphasized in most school systems. Accordingly, the conferees reported that secondary school counselors, administrators and teachers regardless of the kind of school, imparted little, if any, information as to financial aid for higher education, the preparation, skills and demands of different careers, the advantages and disadvantages of various occupations, or valid criteria for comparison of post-secondary schools, departments or programs. The most distressing aspect was the frequency of reports of negative advice --counseling which, if they had heeded, would have let them far from the goals to which they aspired and have now obtained. These reports reaffirmed the findings of an earlier Pittsburgh study on counseling of minorities and women which found that the minority and women participants had more negative than positive reports of counseling experiences.*

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*Hilda Jones, "The Effects of Pre-College Counseling on the Educational and Career Aspirations of Blacks and women enrolled at the University of Pittsburgh", 1974, unpublished.

The conferees have managed to overcome or avoid the prejudice which pervades a system that refuses even to acknowledge that many non-traditional career options are available to women and minorities. The aborted careers of many of their less fortunate peers testify to the destructiveness of the race and gender-based bias, so deeply rooted in our counseling systems. For instance, one engineer who attended a predominately white high school recalled being advised to apply only to minority colleges that had no engineering programs, without regard to her particular career interest and with no consideration of other alternatives.

Other Societal Influences

Society exerted various influences on the early lives of the scientists at this conference. Given the very personal nature of conference inquiries, it is not surprising that major movements and events received little discussion. There were, however, indications that World War II, the civil rights movement, space exploration, and the women's movement had significantly influenced the lives of the conferees, regardless of the varying degrees of their individual involvement in those movements. Among the younger women, a few recalled that the space explorations of the 1960's had given them increased awareness and appreciation of science. One Black conferee noted that the civil rights activity of that period gave her added incentive to prove her worth and ability. Racism and its manifestations and effects have been so intrinsically a part of their lives that these women gave little time to the discussion of its manifestations, except in the context of particular experiences.

The social problems associated with minority group status were made less difficult to bear by the positive sense of identity inspired by family and other close members of the race or ethnic group. There was for most of these women a secure zone within a hostile world, a place where family and friends buffered with their love and protective care the impact of racist abuse and attitudes. It is interesting to note that the Puerto Rican conferees who, with one exception, were born and began school in Puerto Rico, felt this stigma of inferiority only when they came to the mainland; in Puerto Rico, they were obviously members of the majority group.

There was pressure from school, family and community sources, eventually internalized to some degree, to conform to expected roles, behavior and interests. Pressure from peers "not be different" was a typical experience. Interest in science and the special demands of science courses often set these women apart from their peers, male and female, of all racial or ethnic groups. The lack of role models, of minority women scientists, within the communities, in books or electronic media, contributed to the communication gap between the science world and the minority communities. Some of the values of the minority cultures were perceived as being in conflict with the priorities of preparing for a science career.

During their childhood the "real" world of many of the participants and their families was geographically small. Thus, when educational opportunities outside their familiar regions presented themselves, the mere distance from home was a barrier. For several of the conferees the necessity of leaving their communities to attend school was a serious problem due partly to strong ties, family responsibilities and poverty. In some societies, it was expected that one would remain in the community, marry and begin a family regardless of any career interests. For several of the women, having to choose between equally important roles and activities was extremely difficult. Most had hoped to combine a career and family life eventually, although a few conferees--some divorced, some single, some married--expressed pessimism in retrospect about the feasibility of doing so. As for returning to the communities of their birth, various circumstances, including limited job opportunities in some fields, made this difficult. It was, after all, the initial break at the end of the high school years that was hardest. After four to ten years of education away from home, most women had adapted to the change.

When the conferees first went off to college most had in mind careers in teaching at the primary or secondary level where they expected somehow to share their interest in science. A few aspired to medicine. Except for the more recent graduates who went into engineering programs straight from high school, most of the conferees knew little about other careers in science; they had limited their own career aspirations to the traditional roles they knew best.

Economic and class differences played a part in the lives of these women. In some instances, lower social status and a less than comfortable lifestyle gave fuel to their motivation to achieve and escape the confines of poverty. This was so in the cases of the daughter of the migrant farmers in the southwest, and the daughter of a day laborer and a domestic worker in an eastern city. For others among the conferees, some degree of success was expected; the means were there, and to do otherwise would have been a severe disappointment to family and self.

Implications and Recommendations

Many of the following recommendations, especially those that would improve the public image of science and scientists and the recommended improvements in science education and career counseling, would benefit majority children, both male and female, as well as minority youth.

To the Mass Media:

The conferees agreed that because there are so few minority women scientists, written and electronic media must make more visible their presence and accomplishments. Programming directed to children must be increased and improved to include quality presentations of information about science and scientists. Others, including the women themselves, must take fuller advantage of opportunities such as public service time on radio and television to further these objectives. Stereotypes are built, reinforced and destroyed by books, magazines, newspapers, radio and especially television, as well as by direct observation. The prejudice that exists in the minds of many about the innately inferior intellectual capacity of women and/or minority groups for science must be attacked by the presentation of new images, in programming and advertising. The willingness of women at this conference to participate in such efforts was unanimous.

To School Systems:

Teacher selection and training. School officials need to recognize and accept responsibility in selection of faculty to seek to achieve racial or ethnic and gender composition, across disciplines, comparable to the student body. This does not imply belief that minority women must be taught only by other minority women, but rather, that they should be taught not just by majority men, especially when the course is science. The value of minority women scientists as role models in the schools cannot be overstated. Minority group members must be present on faculties not only to serve as role models but to help with language difficulties and to facilitate student-faculty understanding of cultural differences.

The conferees suggested some strategies, recognizing the fact that the shortage of minority women teachers especially of science would make it impossible to achieve faculty composition comparable to student racial or ethnic and gender ratios at present. Financial suppport for teacher-training of minority women with a commitment to teach (especially science and other non-traditional fields) in their home communities must be provided. Pre-service and in-service training must be available to make all teachers more sensitive to cultural differences, more receptive and responsive to the interest of minority students in science, and better informed about science career possibilities. It is essential that teachers have and convey to minority group girls realistic expectations, equally high as those conveyed to other students. The conferees recommended that the need to give equal challenge and encouragement to minority women students be communicated to teachers during training, since it should not be assumed that all teachers have, by their individual experiences and intellect, developed multi-cultural awareness and sensitivity. It is also possible to use minority women scientists as consultants and visiting teachers where there are no minority women on the regular teaching and counseling staffs. It may also be necessary to look very closely at faculty selection criteria and to eliminate factors which systematically exclude women and minority teachers and emphasize the qualities vital to good teaching.

Integration of science and basic skills. The importance of science education for minority and women students at early stages must be recognized and given adequate, even priority, funding. Science should not be regarded as optional or extra when financial constraints force reduction in school programs. All citizens in our technologically complex society need better information on which to base intelligent decisions. The intellectual and manual skills learned through science are as important basic skills for living as are reading and writing.

The conference participants suggested that pre-school and elementary level curricula which integrate science material with other subject matter, particularly language arts, would be a favorable alternative to most existing programs. For example, appropriate information could be part of the story presented in primary reading books, or used as the basis for the action of the characters. Science material should likewise be used in math problems and spelling lessons. The conferees advised that science not be isolated when there are the more effective and attractive alternatives of teaching it in conjunction with other subjects. Were this to be done, all children would experience an increased understanding of science and its role in their lives, while improving basic communication skills.

Testing. Partly due to their own bad experiences, receiving inadequate, ill-informed, racist and/or sexist counseling, or none at all, the conferees gave special attention to a variety of counseling needs. They recommended that more human and financial resources be committed to the development of culture-fair tools for measurement of intellectual capacity and achievement. Wherever standardized tests are utilized, the participants urged that students be taught techniques for optimizing their performance. They further recommended that widespread action be taken in all schools to ensure early diagnosis and treatment of learning disabilities.

Career counseling. The minority women scientists urged that more emphasis be placed on career counseling. This must include full information about the preparation for, conditions and demands of, and opportunities in a maximum number and variety of science and non-science careers. This is important for all youth, of course, but especially so for those whose families can be expected to have less wide familiarity with the diversity of options in the working world, especially in science. Because of the tremendous impact of parents on the career choice of young minority women, the conferees recommended the development of materials and techques designed to reach parents of minority students to impart factual information about science careers and the lives of scientists. This information must be distributed when necessary through non-traditional channels such as churches, community or tribal organizations and sororities.

Information on higher education and financial aid. Information about financial aid must be complete and readily available. The women suggested that data for comparison of post-secondary schools, departments and programs be accessible to all high school students. They would like a consumer's guide to higher education in science especially for minority and women students.

Course selection. On the matter of course selection, conferees urged that minority and young women students be counseled to study fields which make maximum use of their intellectual potential, postponing decisions which could serve to limit future alternatives. The women recommended that young women and minority students be urged to choose elective courses which, although relatively difficult, create the greatest number of long range options in career selection. The fear of math, science and traditionally male technical courses must be dispelled. The disproportionately high numbers of minorities and women in vocational, home economics and business courses and their subsequent occupational segregation in the traditional service and educational fields must be reversed, and their enrollment in advanced mathematics and science courses encouraged.

Counselor training. Finally, the women suggested that necessary and appropriate changes be made in counselor education programs, both preservice and in-service, to facilitate implementation of the preceeding recommendations. In some instances, administrative adjustment of priorities and policies may be required.

Bilingual education. Schools must give top priority to the development of sound bi-lingual, multi-cultural education programs, and must provide the necessary teacher-training to implement them.

To Scientific Societies and Community Groups:

Scientific societies and state academies of science must recognize their responsibilities to work cooperatively with minority service organizations and various community groups to put young minority women and girls in contact with scientists and to increase their understanding of science careers. Workshops, lectures, internships, one-to-one pairings of interested students and scientists and many other types of projects for local groups were suggested. The conferees urged inclusion of family, especially parents, in appropriate projects, acknowledging the importance of their role in career decision-making. The need was asserted for professional associations to work closely with existing minority community organizations to be sure that cultural values and preferences are respected, and to assure maximum effectivenss. They should find out which minority organizations exist within the communities and explore ways of working cooperatively to meet community needs. Financial sponsorship of projects and/or publications to meet these needs would be an appropriate, positive step toward narrowing the gap between science and the minority communities.

To Policy Makers:

Most of the recommendations to school systems are also policy recommendations. Those that follow are more general. Some of them reaffirm needs previously identified by other studies. Some are not peculiar to science, but deserve emphasis because the choice of a science career, particularly by women and minority group members, is greatly influenced by the quality of one's education as a whole. Recommendations in this category include support for policies that will assure students' early acquisition of good communication skills and enlargement of national policy and programs to assure children bi-lingual instruction and multicultural content, with appropriate incentives to school officials to achieve these ends.

Conferees were also united in their support for special programs that would compensate for educational deficiencies resulting from racial, ethnic or sex discrimination, but they cautioned that such programs to avoid patronizing and to be effective must (1) have continuity built in; (2) accommodate separately, if necessary, the specific needs of the various minority groups; and (3) be designed with substantial participation by appropriate minority group members. Conferees, especially those from the biomedical fields, stressed the need for welfare, health and educational institutions, to be more aggressive in efforts to identify and treat poverty-related health problems, including malnutrition, thus recognizing the importance of sound physical health as a basis for learning activity.

Finally, the conference participants recommmended that curriculum development specialists create low-cost laboratory science programs free of racial and gender bias and incorporating examples relevant to the individuals being taught to make it feasible for all school systems to offer quality science at elementary and secondary levels.

CHAPTER III

COLLEGIATE AND PROFESSIONAL EDUCATION

The second session of the conference probed the collegiate and graduate or professional experience of minority women scientists. The conferees were again divided into small discussion groups that included a mix of racial and ethnic groups and disciplines. Conferees were reminded to note differences due to age, race or ethnic group, class or community, and the experience of peers at each stage.

Discussants were asked to describe the colleges which they attended, both undergraduate and graduate, in terms of size, location, gender composition, racial composition of both student body and faculty. They were asked about the process by which they chose the school and about individuals and factors which affected that choice. Conferees were asked how their education was financed, whether it was interrupted and whether they attended full time. Obstacles and problems were discussed and compared with those observed in the experiences of others. The women were asked to identify supportive experiences and persons as well as those which deterred them. They were also asked what advice they would offer young minority women interested in science. Finally, these scientists were asked, in retrospect, which things they would have done differently.

There was agreement among the conferees that financial strain, in varying degrees of severity, was a factor for most during the college years. This was partly due to inadequate and/or untimely access to information about available financial aid, but mostly, due to poverty. The minority women scientists observed that the cost (financial and personal) of a graduate degree in a science field is prohibitive to many, if not most minority women. The findings of these meetings can be categorized as relating to academic factors and to those of a social or personal nature.

Academic Factors

It was frequently reported that course work at the undergraduate level had been somewhat difficult, not because of intellectual inadequacies, but rather due to a combination of factors. For most of the conferees, secondary school course work had been easy. At the undergraduate level, the problem was often that the necessary preparatory courses had not been offered at the secondary schools they had attended. In many instances precollegiate academic preparation was of a lower standard than that expected by the college. Typically, secondary school had not been sufficiently demanding for them to have developed strict self-discipline and study habits. Where rigorous laboratory science had not been available prior to college, orientation to lab work was an additional hurdle. Most of the conferees felt, as do most scientists, that undergraduate exposure to research would have been beneficial. Most found college work considerably more challenging than secondary schools, but well within the range of their abilities. Exclusion from informal study groups, usually all male and/or majority, made their pursuit of academic excellence difficult. Access by minority women students to fraternity test files, for example, was virtually unheard of.

Academic difficulties at the graduate level were more likely due to inadequacies of undergraduate courses and/or equipment. This was especially typical of the experience of women who had attended minority or women's colleges. Most of the conferees were able to remedy such problems with occasional help from faculty, other students or minority group organizations, but the academic institutions generally failed to anticipate and offer services to address the problems, or did so in a condescending manner.

The need for role models at the collegiate level was underscored by the conferees. While most conferees remembered at least one teacher who had encouraged, counseled and assisted her through a trying time, many had encountered a patronizing attitude on the part of majority science professors. Once again, the need to prove one's ability in the face of low expectations of others surfaced except in minority colleges and/or with minority faculty. Even at highly selective schools, such as Massachusetts Institute of Technology, minority women science students encountered condescending professors with low expectations of them who treated them as if they had not met the same entrance requirements other students had. In this circumstance it was especially hard for the students to ask for routine help when they did need it. Some conferees expressed the fear that this phenomenon may have the dynamics of a self-fulfilling prophecy. For a few of the scientists, attendance at predominantly minority or women's colleges provided a support structure that lessened the burden of differentness. Most of the women's colleges, however, offered less opportunity for the study of science. Of the predominantly minority colleges, most were viewed as being less well-equipped and having less rigorous science curricula, which made competition at the graduate level more difficult. At the graduate and professional level, because there are so few minority institutions and none exclusively for women, most conferees had little choice but to attend a majority coeducational institution

It was not unusual for the student to face a dramatic change in teaching approaches and emphasis, moving from undergraduate college to graduate school. It was typical for the undergraduate training in science to have been classical and conservative, with heavy supervision and for the graduate school to have been more experimental and research-oriented, with very little supervision of students. The contrast was likely greatest when the undergraduate institution was a predominantly minority, parochial or women's college. The result was, for those who had attended the supportive women's or minority schools, not only an adjustment to the different teaching styles, philosophies, standards and sometimes, expectations, but as the findings of the next section indicate, to a much less emotionally supportive environment.

Undergraduate academic counseling was considered poor because of the lack of unbiased advice on course selection, and information about career preparation and advancement such as the merits of a graduate school, post-doctoral research, fellowships and internships. Several conferees complained that they had never had the benefit of tough, honest academic assessment that might have helped them know where they stood or what they needed. The conferees felt that an awareness of the necessity of post-doctoral experience for advancement and mobility in certain fields, biomedical sciences especially, is an example of the kind of information minority women students often do not get. This and similar information must reach the students and do so at the critical times; minority women are less likely than others to have other sources of such information. The social and personal isolation described below really limited their access to significant practical information and assistance.

The graduate student is dependent upon her mentor or major professor for counseling. The significance of this individual in the quality of advice and information one receives is tremendous. This person is eventually the one who writes references and assists the student in obtaining post-doctoral appointments. The success of this intimate working relationship depends heavily on personality factors, including the sponsor's ability to relate to and communicate with the student. For the minority women student in a white male-dominated field, in a predominantly majority institution, the chances of getting a sponsor whose race and gender prejudices will interfere with the effectiveness of this system of counseling are still much too high.

Social and Personal Factors

The choice of a science major, whether in a majority or minority college, served to separate these minority women from same gender, coethnic peers. The conferees documented varying degrees of social and personal isolation, some of them extreme, as a result of their choice of institution and field. At predominantly minority schools the dissociation from other women began at the college level for most. At predominantly majority institutions, this choice usually marked physical separation from the other students and faculty of one's race or ethnic group as well as from other women. While this isolation existed at both the graduate and undergraduate levels, in the experience of most conferees it became progressively worse the farther they went. There were fewer and fewer female peers or role models, especially of minority status, as they progressed through higher education. There were in the experience of the discussants different perceptions in this regard. One engineer, for example, who attended a large predominantly majority undergraduate school with a substantial minority enrollment, felt the isolation to be equally severe at the collegiate level, indicating that this isolation may be characteristic of professional schools regardless of level. Coethnic males, if present, generally related to them as brothers rather than the traditional male-female social roles or, like most majority males, did not relate to them at all. One attractive and personable black woman recalled only two dates in her first three years as an undergraduate in a larger western university. Academic competition was in some instances viewed as an obstacle to conventional social interaction, a perception shared by some majority women in competitive, highly specialized fields. Friendships with majority women were a source of support for some of the conferees, although for most there was an unmet need for social relationships with other minority women who shared their interests.

Peer support was a positive factor in the experience of some of the conferees, especially the more recent graduates who had attended majority institutions. They credited minority studies and other special programs with having created a somewhat larger selection of minority students at majority institutions. Minority or ethnic studies were generally praised by conferees for their positive effect on recruitment and cultural awareness, but not considered a desirable major for most minority students, a judgment not surprising from a group of scientists.

Demands as to style which were culturally alien or unacceptable made matriculation in a science curriculum especially hard for some minority women. One example is the need to pretend indifference and suppress sentiments which women have traditionally been encouraged to express, and men forbidden to reveal, in matters where no gender-related differences exist. Expressing concern about the environmental or sociological impact of a technological or scientific capability is an example of what might have, in an earlier era, been a less acceptable (non-male) posture. The need to assume such attributes as aggressiveness was a burden for some women of minority cultures such as some Native American ones in which behavioral modes or patterns are more sharply defined by gender and age than they are in the majority culture.

Academic and personal counseling, tutorial services, and information about available community services had not been readily available to minority women. Reaffirming the need for special programs to compensate for cultural insensitivity and the disparity in the quality of education afforded minority and majority populations, the conferees found some areas of agreement. Programs addressing deficiencies in academic preparation of minorities should be viewed as transitional activity to accommodate needs which are gradually being removed by major institutional changes. Several conferees described their feeling of frustration, however, with special degree programs which lead to the acquisition of unmarketable degrees that do not make the minority students equally competitive with their majority student counterparts.

Loneliness, pressure to choose a traditional career, to marry, to remain in or return to the community of their youth - in summary, to fill cultural role expectations - was constant. Parents of many of the women had expressed a lack of understanding of their desire and justification to continue formal education beyond the undergraduate degree level. The conferees attributed parental resistance, where present, partly to a public ignorance of science professions and scientists, and partly to parental desire to protect children from difficult or unpleasant circumstances. For some women who chose to marry during school years, there were additional, sometimes more complex problems, conflicting demands and responsibilities. Many women were plagued by feelings of guilt as a result of the choices they made or did not make when family and career needs were in conflict. For others, early marriage added the support and encouragement of a husband and family who helped tremendously.

Implications and Recommendations

Some of the following recommendations are not strictly limited to the study of science by minority women, but are of sufficient importance to them to merit consideration here. For instance, the women of this conference felt as do many other scientists, that undergraduate level exposure to research is an important aspect of one's science education. Some saw a need to involve full-time researchers in the education process for the students' exposure to that aspect of science.

To Academe:

There is much that universities can do to enhance the educational experience of minority women. It should be emphasized here that, except in the matter of financial aid, the women are not recommending anything the system does not already offer to majority, especially male, students in science, engineering and medicine.

Financial aid. The conferees urged that information about financial aid be provided and more effectively disseminated through counseling and literature. Appropriate communication channels must be explored and utilized to ensure that minority and women students are aware of existing opportunities for financial assistance. It was stressed that financial aid should not be viewed as a means of attracting students to science, but rather, as a means of supporting students who have a genuine interest and desire to study science. The conferees agreed that full support in proportion to actual need must be available for minority women committed to the study and practice of science, engineering and biomedical professions. Financial counseling is a related service which should be available to students, many of whom may be managing large amounts of money independently for the first time.

Supportive services. Conferees reasserted that educational institutions have an obligation after admitting students, particularly those with academic deficiencies, to provide the necessary academic, financial, psychological and cultural support services. Funding of supportive programs for minority students must be ample and must not exclude students attending majority institutions with smaller minority enrollments. Regardless of the necessity to be flexible about admission requirements, high standards of competence required of graduates must be maintained.

Faculty role models. More aggressive recruitment of minority women for science faculty appointments is essential to narrow the gap between the numbers of minority students and faculty. It may even be necessary to alter faculty selection criteria to eliminate factors not objectively related to one's knowledge or teaching ability. The institutions' need to have minority women on the faculty must be weighed against considerations, such as the prestige of the school of which the applicant is a graduate, or the renown of the person with whom she did post-doctoral work. Disregard of such customary considerations in favor of issues more germane to the production of minority, women and minority women scientists need not result in a lowering of academic standards. The prejudice that accounts for the tendency of schools to seek minority and women faculty to teach only those courses related to their ethnicity or gender, or those traditionally studied and taught by minority group members and/or women must be eliminated.

Counseling. The conferees recommended that both academic and personal counseling be available and accessible throughout the collegiate and professional training period. Complete academic assessment must be available in addition to information about course requirements for graduate school admission, strategies of choosing electives, and job requirements. Gender and racial or ethnic bias must be eliminated from the system of advising. A recommendation on the matter of electives was that minority women select non-science courses such as management, languages and economics which might enhance one's attractiveness and mobility in the job market.

Job placement. Academic institutions must recognize their responsibility in the job placement process. While schools cannot be expected to find jobs for every graduate, they must be more helpful in preparing minority women students, who have poor access to existing information channels, for job search. Ignorance of job search strategies, including interview techniques, is an obstacle which many minority women science graduates need help to overcome. Those factors peculiar to obtaining professional employment in science must be identified and communicated.

To Scientific Societies:

There are several respects in which the professional associations can play an effective role in amelioration of the problems cited above.

Data collection. The scientific societies in each branch of the sciences are collectors of data on the human resources in those fields. In most fields they keep track of manpower statistics on supply and demand. Some publish extensive directories; others keep close track of students enrolled at the graduate or even undergraduate levels. Wherever such data is collected, it must be collected by race or ethnic group and gender, in such a way that the minority women can be counted and identified.

Leadership. The professional societies have great stature and influence in their respective disciplines, and they can provide leadership for educational institutions, especially through their regular contact with university departments. The societies must raise the awareness in their members and in the departments of the barriers faced by minority women scientists. Societies can help them to recognize the needs of minority women and the effect of the deleterious attitudes and behaviors illustrated in this chapter. The societies must be advocates for the kind of support systems required to remedy past exclusion. They must also share information on what their members and institutions are doing to meet the problems.

Involvement in society activities. The conferees asserted that major professional associations must actively recruit minority women to their membership and consciously involve them in society activities. The societies, perhaps more than any other kind of institution, can provide visibility for the accomplishments of minority women scientists. They should be recruited early in their career and sponsored by the societies, included on committees, in meetings, on task forces. Their concerns must be made specific in exiting committees on the status of women and minorities in the profession.

The conferees further urged that minority scientific societies give specific attention to the concerns of minority women and that they make a strong effort to assure full participation of women in their organizations. Likewise, the conferees urged that professional associations of women seek to fully include minority women in their activities and to address vigorously the specific needs of this group in addition to their general concerns.

Special efforts for minority women. The conferees recommended that programs of the major scientific societies be made to reflect specific concern for minority women scientists. Conferees identified the need for all types of scientific societies to establish and maintain communication with students on an individual or group basis. Some of the needs of minority women science students for emotional support, encouragement, and realistic practical advice, not often provided by university structures, could be met by practicing minority women scientists, engineers, physicians and dentists through projects or contacts within these organizations. It was suggested that invitations to students to participate in association meetings would be a convenient way of providing information of use to the students and making initial contacts. Sponsoring scholarships is another major area of need which professional associations could address.

To Public and Private Funding Agencies:

Funding agencies need to undertake two kinds of efforts on behalf of minority women: they must solicit and fund programs specifically designed to get at the special barriers faced by minority women; and they must assure the inclusion of minority women in all funded programs.

Special programs for minority women. The conferees urged that the recommendations as to the needs and priorities for education of minority women expressed by this and other appropriate groups be taken seriously in the allocation of funds. These scientists strongly suggested that funds be made available to sustain, with necessary support systems, minority women in pursuit of science education. Financial support of post-doctoral appointments for minority women with distinguished scientists was recognized by the conferees as a priority in the equalizing of opportunity in fields where post-doctoral research is valued.

Inclusion of minority women in existing programs. Most important of all, however, is that public and private funding agencies examine all educational and research programs currently being funded, or proposed for funding, from the point of view of (1) their effect on minority women, and (2) the participation of minority women in them. Funding agencies should immediately set about an assessment of the past and present impact of their activities on minorities, on women and on minority women, and require a similar analysis from all programs which they fund. Only when concern about participation of minority women is made explicit, only when their inclusion becomes a conscious part of funded educational and research programs, will we begin to see a significant change in the proportion of minority women in science.

CHAPTER IV

CAREER AND PROFESSIONAL EXPERIENCE

The third session examined the experience of participants acquiring jobs and working in their professions. Conferees were asked about the first job they accepted after completing their education. They were asked how they got the job, whether it was in their field and what choices they had. Comparison of the experience of peers was made. Questions were asked about the influence of others, of family, friends, professors, on the decision to apply for or accept a particular job. Conferees were asked about their preferences for particular kinds of work — how and when they were formed, and what factors were considered (for example, salary, location, opportunity, working conditions). About actual jobs they had had, participants were asked whether they derived satisfaction from the work, how often and why they changed jobs, and what choices they would have made differently in retrospect. The women were asked to recall problems and obstacles in their careers and compare their experiences to those of majority men and women and minority men in the same setting. An attempt was made to determine the differences in experience due to race or ethnic group or gender. Finally, the conferees were asked what advice they would give young minority women who are interested in science.

As was the case in other sections, many of the implications and recommendations are equally applicable to non-science disciplines, particularly those dominated by majority males. Few of the problems are "new discoveries"; it is, however, the hope of the conferees and authors that this reiteration will effectively convey their pervasive, destructive nature and persuade appropriate parties to take immediate corrective action.

Getting a Job

Despite the growth of anti-affirmative action sentiments and movements, employers appear to have been more aggressively pursuing the minority woman scientists and engineers. For industries in which on-campus personnel recruitment is practiced this was particularly evident. This phenomenon did not, however, always result in firm, appropriate offers of employment and indeed may have benefited only the most recent graduates. Women in academe, although recruited differently, experienced similarly the reality of being invited for a suspiciously large number of inquiries and interviews, compared to the number of actual job offers.

The participants noted differences in the salary/benefit packages traditionally offered men and women in academe, industry and, in the experience of one conferee, a hospital. One medical doctor early in her career unknowingly accepted a hospital post at one-half the salary of her male predecessor.

Several of the discussants had experienced this sort of hiring discrimination. Some conferees described what they called their naiveté at the early stages of job search, when they knowingly accepted salaries lower then those offered their male colleagues. Without having prior knowledge of the negotiability of terms and conditions of employment, or knowledge of what others were receiving or being offered, many of these scientists had found themselves in a disadvantaged bargaining position. One scientist at the conference described having been interviewed with her spouse of the same ethnic group and in the same field. Although she had more publications and significant research than he, each university offered him full professional status and offered her a lesser position. One interviewer, a white male scientist, even suggested that the "fact" that "science ages a woman" should deter her.

Among the conferees, graduates of the more prestigious, highly selective institutions and recipients of post-doctoral appointments with prominent scientists seemed to have been better informed and prepared for job search. Again, these women were among the more recent graduates. Although these conferees reported no formal information systems for such information, they had learned what to expect or been given access to job opportunities from a more competitive position.

Women of all generations agreed that majority males have a tremendous advantage in having access to an informal system of "contacts" for entry and advancement in the labor force. Access of minority women to the more prestigious post-doctoral positions and appointments in distinguished institutions has been and remains limited. It is through the informal channels of communication that one learns about the salary-benefit bargaining process, and the strategies for getting the most attractive job under optimal conditions. The circumstances described above contribute significantly to the disparity in salary and responsibility between majority men and both minority and majority women in comparable jobs. The experiences of the conferees fully affirmed the findings of the study, "Psychological and Social Barriers to Women in Science," by Martha S. White*, and illustrates the lack of progress in eliminating salary inequities.

Characteristic of the experience of women regardless of race or ethnicity were the limitations on mobility and the resultant professional disadvantage imposed by family responsibilities and commitments discussed by some conferees. The aborted post-doctoral appointment of one microbiologist exemplifies this predicament. When a change in the location of the husband's employment made his residence in another area necessary, this conferee chose to move and relinquish an opportunity for post-doctoral study. Although the reluctance to cause physical separation from one's spouse in order to realize career advantage is shared by many professional women, there may be a difference in degree between minority and majority women. In cultures where gender roles are more strictly defined, the practice of culturally "deviant" lifestyles, such as separate residences and weekend commuting, is probably more difficult.

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*Science, 23 October, 1970. The subjects of this study were not identified by race or ethnic group.

Despite inhibiting factors, these women's careers evidence an extraordinary degree of mobility, which is indicative of the strength of their professional commitments and the degree to which they overcame cultural restraints.

The Work Experience

The discussants identified several areas of concern in the work experience. In most of their experience up to college and graduate or professional school, racism and problems related to their ethnicity had been the basis of obstacles they faced. In the world of work the pattern appeared to alter itself as the manifestations of sexism became more apparent. Despite their realization of this shift, most of the conferees identified more strongly with their racial or ethnic groups than with women as a group, but noted that, in either case, they were being pressured to choose sides and to identify as one or the other. In their professional levels also, they were seldom allowed to be comfortably both.

The conferees generally had achieved a large measure of personal gratification from their work, despite a number of hardships. Because of values and/or adjustments on their part, not typical of majority, especially male, colleagues, most discussants felt that they were functioning effectively in their jobs and expressed satisfaction with what they are doing. Frequently, this satisfaction derived from a reordering of priorities. For instance, one conferee, trained in a highly specialized field, has developed her interest in teaching and curriculum development and is making a contribution at the pre-collegiate and undergraduate levels despite the considerable underutilization of her research training and skills. Due, in part, to mobility constraints of parenthood, this scientist has not realized many of the professional opportunities typically afforded those of her male-dominated profession. Another of the conferees is currently employed in a position neither on a tenure line nor in her field of specialization. She is deriving satisfaction from development of innovative science curriculum for undergraduates and limited research. A third participant, who is currently studying for a fifth university degree, found an area within her company where her unique combination of skills could be of use. After creating a job for herself, this scientist returned to school to gain additional expertise for her new specialty. It has been through their accommodation to circumstances that did not quite meet their needs and/or their possession of values atypical of men in their profession that many of these women have been able to maintain viable careers in science. In very few instances did they note efforts or actual accommodation on the part of the institutions.

Although the industrial work setting provided some of the most blatant examples of the indignities and repression experienced by these women, discrimination in academe was reported to be equally pervasive but more often manifested in subtle ways more difficult to combat, and perhaps more damaging. One biology professor recalled being asked, with an "of course you'll understand" attitude, to relinquish valuable laboratory space to a man who was being hired before additional space could be rennovated.

In both work settings the discussants reported several kinds of differences in the types of assignments given men and women. In the opinion of the conferees, considerations of factors not related to their ability and professional competence, but rather based on sexist or racist stereotypes had too much to do with job assignment. Where a clear line of advancement existed in industry or academe, women were often given "off line", dead-end jobs. Some conferees reported an incredible amount of consideration given the prejudice of co-workers. A few of the women even recalled assignments having been denied them because "the men just wouldn't work for you." In a recent incident a physicist working for a large corporation told of the refusal of one male co-worker to accept an assignment under her supervision. When advised by management that his choices were limited to cooperation or termination the situation became suddenly more tolerable for the reluctant male. Management's awareness of the law was undoubtedly a factor in its response. From the experience of the conferees, this unequivocating leadership was viewed as the most acceptable, effective approach to the problem.

It was generally agreed by the conferees that even when men and women began at the same level, in either academe or industry, unfair promotion policy and/or practice advanced the men at a much faster rate; if one began below the appropriate level there was practically no chance of ever "catching up."

It was observed that men were often presumed to have "innate" abilities and suitable personal traits for management level positions for which minority women needed credentials. The "grooming" of a protégé or informal on-the-job training were more frequently part of a system from which women are excluded. Many rewards were conferred and decisions made "over lunch" or "over cocktails" at other social gatherings from which these women had been excluded. The de facto or systematic exclusion of minority women from personnel, tenure and other committees which decide promotions in some organizations is a factor which reinforces existing discriminatory employment practices. The most distressing aspect of this situation is that their absence is of little concern, if noticed at all, by the individuals in authority. Recognizing that few institutions have enough women or minority persons, let alone minority women, to participate in all the activities that need their input, the conferees asserted that minority women's interests and concerns must be represented by other means. Such means include but are not limited to use of minority women as consultants and visiting critics.

All participants regardless of work place reported that as minority women in their fields they were repeatedly forced to reassert their competence. Men frequently showed surprise that they were able to perform well. After a period of time on the job, the questioning of competence came only from new acquaintances and situations away from the primary work site, but it never completely ceased.

The informal channels of contacts for advice of and support of grant applications have not been open to women, certainly not minority women, and particularly those at minority institutions. There is a need for help from some source to put women in a position competitive with male colleagues on the matter of getting grants, especially for research. Most had not been part of a peer review system or had other occasion to review proposals. More than one of the conferees had worked for an employer who invested less money in equipment and support services for her research projects than for those of equally productive male counterparts. This practice typically lessened their chances of receiving research funds from foundations or government.

The conferees felt strongly that management and administrators consistently gave different interpretations to identical behavior by males and females. A woman might be considered "pushy" for doing what is assertive for a man, or emotional and loquacious as compared to a sensitive, articulate male. Yet, in order to succeed in most traditionally male professions, classically male behavior styles and attitudes are often demanded. Most women at the conference had adapted to often uncomfortable personality styles to advance in their professions. Some had been forced to assume aggressive postures to be sure that they were not "overlooked" for promotions and raises or denied opportunities or taken advantage of by being given excessive or inappropriate committee assignments. One scientist remarked about the shock expressed by her employer when she requested a salary increase to bring her salary in line with those of male colleagues. It was only after she announced she was leaving that her employer began to take her seriously, and treat her more fairly. This type of experience was not felt to be peculiar to science careers but rather typical of male-dominated professions. Conferees asserted that this aggressive personality style was required not because it was necessary for doing good science, but only because it is the style of the predominant group in science. The conferees observed that the establishment of which they are now a part had been cruelly insensitive or reluctant to receive and accommodate them. The women regretted that in most instances it had been they who had adjusted, conceded or, at best, compromised. They look forward to the time that professional qualifications and competence will replace stereotyped demands.

Especially during the early years of their careers, most of the women had encountered a paternalistic, often patronizing, majority male supervisor. He was likely to offer unsolicited advice in the "father knows best" tone, be overly concerned and protective about her physical well-being, or too eager to explain or defend her actions when she was perfectly capable of doing so herself. Most conferees had encountered one or more intelligent individuals in responsible positions who did not know that: (1) all women do not prefer to serve on the social committees; (2) all minority group members were not reared in ghettos; and (3) all women do not type and make coffee.

The existence of sexist language in manuals, official documents, correspondence and jargon of traditionally male professions is offensive to women working in those fields. Conferees further asserted that as minority women they too frequently had to contend with insulting, insinuating social gestures and advances. One young Black scientist told of having been questioned by hotel detectives who had assumed she was a prostitute because she was going in and out of rooms for meetings and receptions, as were her colleagues who just happened to be white males.

The discussants identified one of the major hazards of tokenism - the burdening of the few available "tokens" with more than their share of responsibility. Scientists are not professionally rewarded for non-science activities which in the case of minority women are frequently presumed to be part of the job. Women tend to be assigned, or voluntarily assume, social responsibility for the planning and preparation for receptions and other tasks historically performed by faculty wives or secretaries. All of the conferees reported that they were expected to perform auxilliary functions, such as student counseling or membership on committees concerned with women's and/or minority interests, recruiting and administrative tasks associated with special programs for minority group members. While all were more than willing to give service in these areas, they deplored the fact that the additional physical and mental exertion and resultant professional disadvantage are not even acknowledged, let alone compensated by the employer. Because of the traditional evaluation criteria for advancement, they are forced to choose between their professional commitment to conduct research and publish, and their commitment to the interests of their minority group and/or women. To choose the latter is professional suicide. Women scientists just cannot do all these extracurricular tasks and maintain high levels of scientific productivity. Employers must either expand their criteria for rewards, provide support services sufficient to help women reach the established criteria or hire other specialists to do the extracurricular jobs. There was unanimous agreement that employers must be made to recognize the value to society and its institutions of the work done by women such as these in the interest of facilitating full participation of minority group members and women in American life.

While there was no consensus of support for the ideas of part-time and shared professional positions with full proportionate benefits there was general agreement on the need for flexibility in work schedules. The main source of discord on the question of less than full-time jobs was apprehension that some people, most probably white men, would abuse the opportunity. In their experience this had forced additional responsibility on others like themselves and reduced the quality of education, products or services available to students and clientele.

It was observed that private sector employers were more likely than academics to look unfavorably upon non-professional involvement. Most, if not all, private and public sector employers reportedly look less favorably upon race or gender-related activity or political involvement than upon general interest civic activity. Consider the contrasting reactions one inspires by working for the United Fund as opposed to the National Organization for Women or the National Association for the Advancement of Colored People. One conferee reported that she never let anyone at her company know when she participated in meetings such as this one, even though this was a meeting of scientists and supported by the National Science Foundation. Private industry, especially, was described as being inappropriately concerned about and inclined to attempt control of employees' involvement in political and community matters.

Male/Female Relations and Family Factors

Although this subject was not a designated topic for discussion, the significance of men in the lives of the conferees was frequently alluded to, and more frequently in connection with employment than education. The conferees discussed the supportive and inhibitive roles of fathers, brothers, and/or husbands. Family, societal and peer pressure to marry and bear children, and/or to leave science were reported. Of the participants, many had married late. Others had married early, and some had divorced. Some divorcees had remarried. Some in the group were widowed. The younger scientists were, on the whole, not married. The occasion of marriage or divorce had brought about the most obvious point of change in their career patterns and affected their mobility one way or another.

Similar to the experience of majority women there were problems in the efforts of these women to reconcile often conflicting demands of family responsibilities and those of very demanding science research careers. Though spouses of some of the conferees had managed intellectual agreement to the accommodation of their career demands, few had consistently followed through with actual cooperation.* Generally the perception of these minority women is that women's feelings of domestic responsibility are stronger in minority cultures. The women generally had made the concessions with little or no expectation of sharing traditionally female responsibilities. There were exceptions, however, as in the case of one Mexican-American woman whose husband had voluntarily assumed specific household tasks, one Black conferee who had a written detailed marriage contract with her prospective husband, and the Native American woman whose husband provided primary child care while she worked away from home. More typical, however, of the conferees' experience was the woman who began each day at 6:00 a.m. so she could study before cooking breakfast and beginning her daily routine.

The coming of children had added pleasure and joy for these women but complicated their lives. Child care is in most of these communities, except for the Native Americans, a non-male activity and the burden falls largely on the woman. Their decisions, therefore, to plan a family affect their careers, rarely for the better. One mother of young twins has chosen to give up her management level position and return to a less demanding research job within her department so as to have more time with her children. There was, for most parents, a necessity to think about adjusted working hours, time out briefly from careers or, in short, flexible possibilities for both time in and time out of work. Some of the women expressed guilt at not marrying if one did not, and not having children if one did not and about caring adequately for children if one had them.

There are special cultural barriers to careers in science based on views of marriage, roles, conceptions of relatives and a woman's priorities. One Mexican-American conferee described the difficulty her "in-laws" had understanding and accepting her marital relationship because of the non-traditional roles she and her husband assumed. These women were obviously tremendously strong and resilient to have withstood the combined stresses of sexism, racism and strong cultural traditions and still become scientists.

Implications and Recommendations

To Employers:

The need for prospective minority women employees to receive information about company policies, promotion practices, and the evaluation procedure prior to job interviews was asserted by conferees. In both university and private industry they saw a need to know how the employer or prospective employer views various kinds of social, civic and political activity on behalf of minorities and/or women, both on the job and in the community. They suggested that employers reexamine their expectations and assumptions in that area.

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*This theme is echoed in the responses of a recent mail survey of women in basic research conducted by the Office of Opportunities in Science. Some women scientists, even those married to supportive, cooperative husbands, voice the need for a "wife" to perform the helping functions... helping functions that their male colleagues have wives to perform.

Recognition and rewards for the time and energy spent in the interest of increasing the numbers and improving the status of minority women is called for. Funds must be available for research and teaching assistants, release time and other support necessary to permit minority group women to continue to provide needed administrative and counseling services without jeopardizing their professional standing. It was recommended that employers institute assignment, salary and promotion review procedures to ensure that responsibilities and advancement are decided in a systematic and fair way. This must include fair evaluation of non-science job-related functions. The burden of having to demand rewards which have been earned by performance must be removed.

The numerous manifestations of institutionalized racism and sexism in language, literature and practice must be eliminated by employers, if women, especially minority group members, are to have truly equal employment opportunity.

Financial and policy support for employee child care programs and facilities was recommended as an appropriate employer response to one area of need. In-service grantsmanship education must be provided when necessary to minority and women professionals to ensure fair competition between minority and majority applicants for available funds.

To Scientific Societies:

Many of the recommendations to the professional associations found in the previous chapter will also have the effect of improving the lot of employed minority women scientists and should be repeated here also. Professional associations must be advocates and leaders. They must continually assess the status of minorities and women, especially of minority women, in their professions, provide them with visibility and honor their accomplishments. Minority women scientists must be consciously included as participants and invited to present papers at professional meetings, appointed to committees of the association and encouraged to participate in every other way possible. Efforts must be made to ensure that women are included in the societies' programs for minority persons and minority women included in programs for women.

Professional associations can also complement the information available to minority women scientists on employment opportunities. The referral services operated by many of the societies need to be augmented to offer information about job prerequisites, interviewing techniques, problems peculiar to women and minorities in certain kinds of work, and strategies for coping with problems on the job. When other organizations such as the Women in Cell Biology have offered such services at a professional meeting, majority male colleagues have found them equally valuable.* Scientific societies can also sponsor career workshops, films, newsletters about scientists and what they do and, especially, about minority women who are doing it. These were seen as necessary tools for preparing young women for what lies ahead.

To Policy Makers:

Although the conference participants did not appear to feel particularly threatened by lay-offs in industry and declining university science enrollments, they expressed concern about certain problems and the affect of these developments on both minorities and women. The conferees asserted that disproportionate lay-offs of minority group members and women in accordance with labor contract seniority provisions must not be permitted to eradicate the effects of measures taken to compensate for past discrimination. The conflicts have to be reconciled without once again victimizing minority and/or women employees who have just gained entry to certain industrial and academic positions.

Other policy recommendations in Chapter VI when adopted will also have the effect of approaching equal opportunity for minority women scientists.

To Funding Agencies:

The conferees identified the need for a communications network among themselves for the exchange of information, mutual support and group action. They cited the need for identification of others like themselves, compilation of a roster, and publication of a newsletter. They urged that foundations appreciate the need for and value to both minority women and society of programs of this sort. The need for efforts to increase the visibility and effectiveness of minority women scientists and eliminate barriers to full participation by this group must be met with financial as well as philosophical support. There must be programs designed to extend their energies and enable minority women scientists to effectively give career information, guidance, encouragement and inspiration to large numbers of minority youth and their families.

The women asserted that groups such as the one formed by this meeting should assume an advocacy role, for example, in support of affirmative action in funding of grants and post-doctoral appointments. They will need outside financial support to do so.

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*Workshop, "How to Get a Job", arranged by M. Clutter of the Women's Caucus, Society for Developmental Biology, Orono, Maine, June 3, 1975; Workshop, "How to Get a Job in Cell Biology", sponsored by Women in Cell Biology, at the American Society for Cell Biology, San Juan, P.R., November, 1975.

CHAPTER V

THE DIVERSITY OF RACE AND CULTURE

In the fourth session the conferees separated by race and ethnic group, and each group met to consider their separate, culturally defined needs and concerns and to sharpen as necessary the general findings and recommendations of the conference. In the plenary session that followed, each group discussed its perceptions with the other conferees. It was a frank and honest discussion in which the members of each group articulated their differences and criticisms without animosity or divisiveness. Typical of the open mood of the exchange was the following bit of dialogue. One Mexican-American conferee said that members of her group were surprised and disappointed to see that there were thirteen Black invitees, and only six of their ethnic group, to which there was heard a chorus of "Amen's". Then a Black conferee responded that she saw the same list as thirteen Black and seventeen others. The momentary tension dissolved in humor as the paradox was illuminated by a third conferee who stated that she saw it as twenty-nine and one, since she was the only invitee from her geographic region. Such banter, though humorous, reflected racial and regional biases which have been used to pit groups against each other despite their common problems and needs.

The conferees agreed on a number of matters. Special programs designed to help minority group members must be planned with individual group needs and cultural differences in mind. The group asserted that what works for one race or ethnic group in one part of the country will not necessarily be effective for a second group in another area. The minority groups must not be pitted against one another to compete for a disproportionately small share of funds and opportunities. Minority women must not be pitted against majority women or put under pressure to choose allegiance to either minority or women's groups.

There was unanimous support for multicultural and bilingual education. Conferees further affirmed their support for the continuance of women's colleges and minority institutions as educational alternatives which have provided essential cultural support to their students. They pointed to the support provided by the Black colleges and the implications of that experience for other groups. Eight of the thirteen Black conferees had attended historically Black colleges at some point in their education. The group felt that while they had some disadvantages, the predominantly Black schools had provided for many women a supportive environment and offered a firm background and starting point for what was to come. Majority institutions with large minority student enrollments offered a similarly supportive environment although usually without minority teachers and role models in science.

The Native American Scientists

The Native American conferees pointed out to others early in the conference that every tribe is different though all Native Americans share some values, concerns and experience. It is a mistake therefore to think of all Indians as a monolithic group or to generalize from one tribe to another.

The Native American conferees identified a number of needs and concerns that were unique among the minority groups. They, more often than the Black, Puerto Rican or Mexican-American women, were the "exceptions to the rule", probably because of the unique position of the Native peoples in this country.

Strong dissatisfaction was expressed with the schools and programs operated by the Bureau of Indian Affairs (BIA). Unlike other minority schools, these were alienating rather than supportive institutions. Although all but one of the Native American scientists had begun their education in BIA schools, none of them completed it there, not even the woman whose mother taught in one. The financial aid for education provided by the BIA was described as inadequate and arbitrarily awarded. One Native American woman who sought assistance for medical education was told that aid would be available to her for nursing education but not for medical school.

There was concern expressed that other government agencies not exclude Native American projects from consideration for funding because of the ill-founded notion that the BIA will provide for them. This situation is made worse by the attitude of some Native Americans who do not seek assistance elsewhere because they feel that the BIA should meet their needs. It has been the observation of the AAAS Office of Opportunities in Science that other agencies shun responsibility to Native Americans on the assumption that the Native American division of the Office of Education or the BIA will take care of the need. It was recommended that both the legal and attitudinal bases for this assumption be examined.

The Native American conferees stressed the need for groups interested in helping them to work within established structures of their communities. There is a strong distrust among Native American people of large outside organizations. In order to be effective and have the cooperation of most of the people, tribal councils or other authority figures within the communities must be consulted.

Traditional scholarships have helped some Native American students to get formal education. But, as was the experience of one conferee, the amounts offered are often merely a fragment of the actual cost of going to college. This particular woman had to turn down an offer of assistance because her resources were not sufficient to provide for the remaining expenses. "Good faith" efforts to aid Native Americans in obtaining higher education must take into account the total expense required relative to available resources.

Quality programs and facilities which require a minimum amount of displacement from one's community are needed. The Native American conferees felt that they more often than others, must leave their communities to get quality education as well as health care and other services. It was agreed that educational alternatives must include facilities near their home communities.

The Native American women observed that most of the special programs for minority groups seemed to have been designed for urban settings and were not appropriate for implementation in rural settings. Most felt that there was a need for programs developed for and/or adapted to their environment and lifestyle which would respect the cultural integrity of the people. One example of such programs is a science curriculum developed around tribal traditions and needs which includes discussion of ancient healing practices.

Among the Native American women nominated and including those at the conference, there was a priority, even urgency, expressed for training in the applied sciences, engineering and medicine especially. They recognized the Native American need for practitioners and consultants on questions of land use and special health problems, areas where "outsiders" would not likely be trusted. It was felt that the desire of Native Americans to render immediate service to their communities made it preferable to defer involvement in disciplines with less immediate benefit to the community. This recommendation is not unexpected since four of the five conferees were in medicine or engineering. Nevertheless, the needs themselves would suggest that higher priority be given applied sciences.

The Puerto Rican Scientists

The Puerto Rican women, with one exception, had in common the experience of having spent part of their formative years in Puerto Rico where they are the majority ethnic group. This experience gave them a somewhat different self-concept than other minorities present. They agreed that in coming to the mainland the experience of being treated as a minority group member was often traumatic. For most it was extremely difficult to adjust to not having people with whom to speak Spanish, and having to teach oneself a new language with very little help and in a minimum amount of time. In addition to racial discrimination, they identified language problems as a barrier to education and employment on the mainland. Even with their exceptional proficiency in English these women considered language difficulties a persisting problem.

The quality of education for mainland Puerto Ricans was a source of great concern to the conferees. Because the larger numbers of Puerto Ricans tend to be found at the lower economic strata of mainland society, the quality of education afforded them is below the standard of the average mainland or Puerto Rican school. Mainland Puerto Rican students have very few role models, especially Puerto Rican women teachers of science. The women observed that even very bright students often drop out of school. They attributed this to problems related to language difficulties, cultural factors ignored or poorly handled by schools, and racial discrimination by students and faculty. One of the scientists at the conference had spent two of her precollegiate years in a class for mentally retarded students because of erroneous diagnosis by school personnel. The women agreed that much must be done to improve education and social conditions to enable Puerto Rican people on the mainland to attain education and jobs in all fields, especially science. They urged that Puerto Rican scientists, especially women, become more visible to students and that more programs for career counseling that includes parents be developed. They identified a need for an organization of Puerto Rican scientists to provide mutual support and address some of the areas of need, such as counseling. The women felt that such a group could provide role models, males and females in science careers, for young Puerto Rican students.

The conferees perceived no significant problems with sex discrimination on the island of Puerto Rico, but were very much aware of such problems on the mainland. They felt that equal, active participation by people of both genders in careers and education was not unusual for developing countries. They pointed out that in the universities women shared equally with men in both numbers and rank, unlike the universities of the mainland. Industry was probably a different situation where women scientists were less welcome. One of the conferees, upon leaving the university, sought unsuccessfully to find a job in industry. She eventually left home and sought employment in industry in New York City, where she also had a very difficult time, but finally succeeded.

The Mexican-American Scientists

The Mexican-American conferees felt that cultural gender role expectations, which they had internalized, strongly influenced their self-concepts and behavior. It was difficult at times to disregard things they had been taught about appropriate behavior and roles. Women had been taught to give priority to family needs and concerns, assume responsibility for most domestic functions, and respect the authority of the man as head of the household and spokesperson for the family to the "outside world".

In the lives of most of the conferees there had been a supportive man, either husband, brother or father. Male Mexican-American scientists they had known were, however, perceived as much less supportive. The conferees felt that the need for female role models was even greater than the need for co-ethnic male models in terms of motivating Mexican-American women to consider science careers.

Differences in "class" defined by economic factors and skin color were discussed. Physical likeness to the majority population enables many Mexican-Americans to avoid the hardships of racism, they reported.

The Mexican-American conferees considered Black people to have an advantage in having been organized longer to address race-related problems, and thus having developed some effective strategies and vehicles. It was felt, however, that Black people, being more visible as a group, were often more susceptible to racial discrimination.

The group expressed displeasure with the frequent use of the word "minority" to mean Black, since the term is equally applicable to other racial or ethnic groups.

A problem shared by some members of other groups was the feeling of distance from one's community as a result of advanced training, or interest and training in a non-traditional field. One Mexican-American conferee said she had participated in various Mexican-American community organizations without revealing her career interest or status, so as to avoid any strain in her relations with co-ethnic peers.

While the language problem was given less emphasis in their discussions it was no less difficult for the Mexican-American women than for the Puerto Rican women to make the adjustment to English. One significant difference seems to have been that the Mexican-American conferees learned English as young girls because all had attended English-speaking elementary schools. They had been punished for speaking Spanish at school but had been given no formal assistance in learning English. In some instances their parents or guardian spoke only Spanish. So, while the problem was less recent for the Mexican-American women and possibly buffered by peer support and the opportunity to speak Spanish at home, the experience was no less difficult for them.

The Black Scientists

The Black conferees expressed the need to strengthen and expand existing support systems to meet changing needs. Family, community and minority institutions, including sororities, have had a strong positive influence on the efforts of Black women to advance.

These conferees felt that in implementing special programs aimed at stimulating increased awareness of and interest in science, use of established organizations such as churches are vital for effective communication. In many Black communities, ties with the church or with a sociopolitical or civil rights organization are very strong. Fraternities and sororities (post-collegiate chapters) play an important service and leadership role in many Black communities. More people are likely to be reached and a more positive response generated when trusted and respected media are used for communication. Membership in Black women's social and service organizations was held by many of this group. Such organizations, typically joined during college years, have alumni chapters which in many communities provide a range of services. Many of their activities are youth-oriented and include sponsorship of teenage girls clubs, fund-raising talent and fashion shows as well as various contests, usually to support scholarship funds. These women are often engaged in long-term charitable projects for less fortunate members of their communities, in addition to participation in national drives such as the March of Dimes. They serve as role models within the community and are personal friends and counselors to young people to whom they have no obligatory ties.

Traditionally, Black women have been urged by family and community to get as much education as possible. The assumption that, as adults, they would work was common to all. Many discussants recalled that there was an urgency about "keeping them out of white folks' kitchens" so that they would not have to contend with sexual exploitation by white male employers. There was the sense that their brothers could survive regardless, but that girls needed education for protection and security. Among the conferees some had seen their own education given priority over that of male siblings when limited financial resources forced choices.

Among these women there were extreme variations in the financial means of the families into which they were born. There was, for example, one conferee from a family of twelve whose parents had not completed high school. The family lived on the father's income from bricklaying until his death when the conferee was five years old, after which they received a small pension. Another Black conferee was the only child of parents who had not completed high school, but maintained a viable real estate business. Her father, too, died during her youth. A third conferee was one of two children whose parents each had master's degrees and stable incomes.

Most of the Black women had attended predominantly Black schools for pre-collegiate, and collegiate or some part of their graduate education. (Of the forty-six conference nominees who supplied this information, twenty-eight had attended Black colleges.) Regardless of the level, attendance at schools at which they were in the majority had been a significant experience. It is clear that Black colleges have been very important in the production of Black scientists, and that they must be supported financially in their efforts to continue this tradition.

Compared to the sentiments expressed by some of the other ethnic groups, the Black scientists felt that their high levels of achievement in science had been much less a source of alienation from their communities. The relatively greater numbers, urbanization and visibility of Black professionals and the existence of Black teachers and institutions may have contributed to this difference.

CHAPTER VI

RECOMMENDATIONS, PROGRAMS AND CONCLUSIONS

In addition to the recommendations attached to each of the earlier chapters, the conference participants made some strong recommendations on some general policy questions and some requests for specific follow-up projects.

Policy Recommendations

The conferees strongly and unanimously recommended that the commitments of government and foundations to the alleviation of inequities in science education and employment be long-term, assure continuity and end only when the need is eliminated. Sporadic attempts to solve major institutionalized problems may well waste energy, time and money.

In the federal programs for minority group members, women must be included. In programs for women run by the federal agencies, minority women must be included. They must be included consciously and conscientiously and there must be special programs developed for minority women as necessary when their interests are not met by either the programs for minorities or for women.

The conferees want the program funds for recruitment and training of minorities and women in the National Institutes of Health and the National Science Foundation to be increased annually. In FY 1975 NSF budget approximately seven million dollars out of a more than seven hundred million dollar budget was devoted to programs aimed at increasing the pool of minority and women scientists. This means that about one per cent of the budget is directed at the improvement of science education and opportunities for women and minorities, a portion of the population who comprise more than sixty percent of the total. The conferees wish to see a much larger portion of the NSF and other federal science budgets committed to the increase of women and minorities in the sciences. If there is true commitment to these goals in these agencies their budgets should more nearly reflect that commitment.

The conferees pointed out that data, wherever and whenever collected, must specify both sex and racial or ethnic group in all categories and be reported in such a way that it is possible to tell how many minority women are actually being counted in each case. It is not sufficient to collect data by sex and race and report only in those categories. The minority women's position gets lost when that is done.

There are pressures and tendencies in educational institutions and elsewhere in the world of science that tend to pit women and minorities against one another and to force competition and hostility between them. Conferees urged all educators and administrators in government, universities and industry to be aware of this tendency and to guard against it in both policy and in practice. Women and minority group members must also be utilized at all staff levels and on all advisory and peer review groups by these institutions. Conferees were displeased with the absence of women and minority persons at the highest levels of administration and scientific management in the universities, research institutions, federal agencies and laboratories.

The conferees stated their firm support of the principle of affirmative action and went on to record their dissatisfaction with the current federal enforcement of affirmative action. They wish federal agencies to take a more active role in monitoring affirmative action in order to correct current deficiencies in the existing pool of minority persons and women. Affirmative action must be applied to education and training as well as to recruitment, hiring and promotion.

The conferees want an affirmative action reporting requirement and impact statement built into all federal grants and contracts, including those for science research, and aggressively enforced with leadership from the top. They believe also that grant applications should all have on them a volunteer question which will enable minority applicants to identify themselves if they wish to do so.

Minority women are not found in the mainstream of science on the whole or in the mainline of the scientific referral system. They need, therefore, information about funding and about training programs in science. Information must reach them where they are. There must be adequate ethnic or racial variety, and inclusion of women as members of staff of federal and private funding agencies to make sure that the information reaches minority women.

The conferees deplored tokenism and its destructive effect wherever it exists. They wish to see minority and women scientists present in all professional groups in sufficient numbers that their multiple concerns and points of view may be shared with the majority colleagues. The scientific community is reminded that there is no one minority or woman's or minority woman's point of view. These are diverse groups with varied experiences and insight which are invaluable to decision makers. Thus, they must be included in sufficient numbers to insure recognition of diversity.

Proposed Projects

The minority women scientists at the conference outlined a number of projects for which they see need and in which they would like to be involved.

The women proposed that a communications network be established among minority women scientists with whatever supportive services are necessary. It could be used, for example (1) to circulate information on available grants, financial support for students, publications of interest to minority women scientists, information on crucial legislation and opportunities; (2) to develop support for each other and for younger minority women by making available role models and guidance of both an academic and personal sort; (3) to identify minority women for appointment to advisory councils of government agencies, policy making bodies having to do with science, etc.; (4) to develop programs cooperatively or separately among the minority groups; and (5) to keep them informed of each other's activities.

The participants recommended that a roster of all of the minority women in the sciences, engineering and medicine be compiled and distributed to facilitate communication among themselves.

The conferees discussed with much enthusiasm the idea, mentioned previously, of a circuit of minority women scientists traveling throughout a region to inform and advise youth about science careers. This program was seen as a means of providing role models for minority group girls and their parents and a direct source of information for community groups, counselors and students. In recognition of the fact that a project of this kind, no matter how well organized, could not reach everyone, the conferees recommended production of a film or films of minority women in the sciences for use in junior and senior high schools, a film or films comparable in effectiveness to "A Piece of the Action" or "Code Blue". Television spot announcements highlighting the work of minority women scientists might be used similarly to reach a wider audience.

The discussion groups dealing with collegiate and professional education suggested a "consumer's guide" to graduate and professional programs which would enable minority women students to choose wisely among a variety of programs and institutions on the basis of the kinds of academic, psychological and cultural support available to them.

Finally, the participants asked for a follow-up meeting of this conference at a college campus such as Spelman, and regional meetings involving more of them. They also urged that regional meetings be planned to bring in all of the minority women in the sciences in a particular geographic region regardless of degree level. It was suggested that the groups be organized to serve as minority women consultants and establish regional communication networks.

Conclusions

These thirty minority women scientists from the Native American, Black, Mexican-American and Puerto Rican communities have found their careers in science, engineering and medicine to be exciting, demanding and rewarding. Their extraordinary resilience and commitment have overcome the obstacles that have discouraged many others. While reluctant to concede their own specialness, the participants in this conference were unanimous in their determination to change things so that other able minority women need not be so very special to have careers in science.

Through this conference these scientists have shared their experience and insight that many others like them can have a better chance in science. To the young -- and their parents, teachers and counsellors -- they urge that students keep their options open by taking mathematics and science in the pre-collegiate years, and that they consider the many careers in which science is useful. They would have their young colleagues understand that the road is not easy, the price of a career in science high. There are sometimes sacrifices and difficult choices to be made. They would not hide from them the fact that the obstacles are greater for minority women than for others, and the resources fewer. Nor would they hide the great satisfactions of a career in science.

These minority women scientists desire also to share their experience with others in positions of importance, to help them understand and correct the forces that work against minority women. They hope, therefore, that this report will be read and discussed widely by employers of scientists and engineers, by policy-makers and administrators in education, government and funding agencies, and by university faculty and school administrators and teachers. If these people will inform themselves and understand how being a minority woman has disadvantaged these scientists, they can set about correcting the attitudes, systems and behavior that, for them, have constituted the double bind.

APPENDIX A

MINORITY WOMEN IN SCIENCE AND ENGINEERING

MINORITY WOMEN IN SCIENCE AND ENGINEERING

by

Betty M. Vetter, Executive Director
Scientific Manpower Commission

Prepared for

AAAS Conference of Minority Women Scientists

Airlie House, Warrenton, Virginia

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There are many facts we do not have about the participation of minority women in the sciences, and a few statistical things that we do know, mostly at the doctorate level. Where information is available about women, it rarely includes a breakout of figures for minority women. Statistics on participation of minorities rarely include the sex breakout.

Over the past two years, the Scientific Manpower Commission has been working on a project to locate and bring together all available data on women and minorities at the professional level, including minority women who are at work or preparing for work at a professional level, both in the sciences and in the humanities. In June of 1975, SMC published a book of data[1] that delineates and describes the statistical information available from more than a hundred sources. New data will be added in semiannual supplements as they become available from any source. However, the book includes very few data on minority women, because such data were not found to be available from any of the many sources investigated.

One of the reasons there are so few data sets that reflect the participation of minority women is that relatively so few are in the workforce or in the educational pipeline leading to the professional workforce. Thus, any data set based on a sample population, either selected or random, will encounter the problem of unreliability because of unacceptably high standard deviations. This is often true even within a total minority population if it is categorized in subsets dealing with particular minorities, and for this reason, data are often reported only for the total minority population. This, too, has many problems. Even in a one hundred percent sampling, the data must be analyzed for those persons who refuse to respond to questions of race or ethnicity or sex; and there is no universal pattern used by data analysisists to deal with the nonrespondents. Among those who respond as minorities, some indicate that they belong to more than one racial or ethnic minority. The American Indian/Chicano combination is not unusual, but it provides difficulty for the statistician.

Another problem encountered in attempting to delineate the professional population who should be counted in a minority status is the problem of foreign nationals. Some of the degree recipients, particularly at the doctorate level, who are members of ethnic minorities will become citizens of the United States, and become a part of the minority population of concern to the nation in terms of opportunity or discrimination. Other foreign graduates are here only temporarily and will never be a part of the permanent work force of the United States. Unfortunately, there is often no way to distinguish between these groups of foreign nationals, and different data sets deal with them in different ways. None are highly satisfactory.

Despite the many things we do not know in a statistical sense about the participation of minority women in the scientific workforce of this country, and despite the errors inherent in the various data collections and their analysis, we do have some useful information.

First, we know that minority women make up only a minute fraction of the science and engineering workforce, and second we know that they are not represented in that workforce in proportion to their representation within the U.S. population, with one important exception. Asian Americans not only are participants in the U.S. scientific and technological enterprise they participate at rates approximating their presence in the total U.S. population. This is true both for men and women. When data for "minorities" are aggregated, we can always be sure that in the science fields, at least, more than half of the minority proportion will be Asian American, although they represent only four percent of the total minority population of the U.S. This group, including the women in it, seem to have overcome whatever problems existed in obtaining entrance and completing educational programs in the sciences, although they apparently have more severe problems in employment than do other minority persons who have completed professional training.

Asian women are approximately .35% of the total U.S. population, and about .34% of U.S. doctoral scientists and engineers. Black women, who are about six percent of the U.S. population, are only one tenth of one percent of U.S. doctoral scientists and engineers. American Indian women, who make up only .04% of doctoral scientists and engineers are approximately .4% of U.S. citizens. Women of Spanish origin are 2.2% of the U.S. population, but less than a tenth of a percent of the scientific workforce.

On the other hand, white males, who make up only 41.5% of the total U.S. population, are 90% of the doctoral science and engineering workforce. Thus it is apparent that women of all racial and ethnic backgrounds except Asian American women are under-represented at the doctoral level in all subject areas, and particularly in science and engineering.

Minority Women Doctorates in Science and Engineering

At the doctoral level, the National Research Council in 1973 found 249 black women, three American Indian, 837 Asian and 34 other minority women in a total science and engineering labor force of 244,921 (Table I).[2] These 1,123 women represent one half of one percent of all doctoral scientists and engineers in 1973 who reported their race. They are 8.4% of the total minority doctoral scientists and engineers. Among these women, three quarters are Asian, 22% are black, 0.3% are American Indians and 3% are other minorities, not defined.

By field, 213 (19%) are physical scientists, 79 (7%) are mathematicians, 10 (1%) are environmental scientists, 25 (2%) are engineers, 493 (44%) are life scientists, 172 (15%) are psychologists, and 123 (11%) are social scientists.

As a proportion of all women doctoral scientists and engineers in 1973, black women were one of every hundred; American Indians one of every ten thousand; Asian women one of every 25, and other minority women one of every thousand.

Employment Opportunities

In 1973, when the National Research Council surveyed a carefully selected sample of all U. S. doctorates, it examined not only the numbers as shown in Table I, but other characteristics including type of employment, unemployment rates, and salaries.

The 249 black and three American Indian women doctorates in science and engineering reported no involuntary unemployment, although we have no information on how much under-employment they might have experienced. Among the 743 Asian women in the work force, 92 (12.4%) said they were unemployed and seeking employment, as were 3.6% of the white women in the doctoral work force. Thirty five of these Asian American women were physical scientists, where Asian women showed an unemployment rate of 20% compared to an unemployment rate among white women physical scientists of 6.1%. The unemployment rate for comparable men was only 1.5%.

Thirty of these 35 Asian women doctorates were chemists, where a total of 151 Asian doctorate women were in the work force, giving an unemployment rate of 23.2%. Five of 23 Asian women physicists (21.7%) reported themselves as unemployed and seeking employment. The unemployment rate among white women doctoral chemists was 5.7%, and among white women physics doctorates, 7.4%. The unemployment rates reported by men doctorates in this survey were 1.8% for chemists and 1.7% for physicists.

Unemployment among Asian women doctorates was 5.5% in the mathematical sciences, and zero in the environmental sciences, while three of 23 Asian women doctoral engineers (13%) reported involuntary unemployment. This is particularly surprising since women engineers are in short supply and high demand. In the life sciences, 10.7% of Asian women were seeking jobs. White women life scientists reported 4% unemployment, and men reported an unemployment rate of 0.6%. We do not have a breakout for involuntary unemployment among minority men, but know from other studies by the American Chemical Society and the American Institute of Physics that their unemployment rates tend to be slightly higher than for all men, but considerably less than for all women in the science and engineering doctorate population.

Among all minority women doctorates in science and engineering in 1973, 205 of the 225 black women who reported employment status (91%), 498 of the 800 Asian women (62%) and 67% of the white women doctorates reported full time employment, mostly in science and engineering fields. An additional 14% of the white, 1% of the black and 10% of the Asian women reported part time employment, while 4% of white, 2% of black and 9% of Asian women held postdoctoral positions. Only 4% of white women doctorates, 1.3% of black and 3% of Asian women doctorates reported they were unemployed and not seeking employment.

Among the 1,611 black men in this survey, 146 (9%) reported themselves as unemployed, but we do not know how many of them were retired or not seeking jobs for other reasons. We have no data on their full or part time status in their jobs.

Few data exist to delineate the doctoral population of minority women in the two years since 1973, although we do know that among 1974 doctoral graduates. 19.4% were women.[3] This included (among U.S. citizens), 265 black women, 25 American Indian women, 33 Chicano women, 20 Puerto Rican women, 69 Oriental women and five women of some other minority. These 417 minority women were 7.5% of the total 5580 U.S. citizen women awarded doctorates in 1974, and earned 1.5% of total doctorates awarded to U.S. citizens. Among all U.S. citizens awarded doctorates in 1974, 20.8% were women.

Women earned 31% of total doctorates awarded to blacks in 1974; 20% of those to American Indians, 17% among Chicanos; and 30% among Orientals who were U.S. citizens. Thus, minority women earned a higher proportion of doctorates awarded to U.S. minorities than did white women, compared to white men.

Faculty Women

About six percent of all women faculty members in all fields in 1972-73 were minority women, (principally black women), but the proportion in science and engineering fields was much smaller than that.[4] We have no data for later years.

Minority Women Scientists at All Degree Levels

Almost the only information available on minority women in science and engineering fields below the doctorate level is data from the 1970 decennial census, and the census counts of minority women in these areas are believed to be overstated. This is because those persons who do not designate sex and/or ethnic background are allocated on the basis of sex ratios nationwide and ethnic ratios in the particular geographic region where the individual respondent lives. In the fields of science and engineering where the population is predominantly white and male, this practice results in numbers that are excessive both for women and for minorities, and particularly for minority women.

In Table II[5] which uses the census data, we cannot tell the educational level, even of the college teachers, except for the black and Hispanic women, Even with these two groups, the numbers are deceptive. For example, among the 54 black women listed as college or university chemistry teachers, only 25 have completed four or more years of college. In engineering, 76 black women are listed as teaching in colleges and universities, but only 57 women are counted as having completed four or more years of college. The 757 black women said to be working in engineering outside of academic institutions includes only 439 who have completed even one year of college. Thus, these numbers cannot be viewed as highly reliable.

In mathematics, 178 of the black college/university total of 244 have finished at least four years of college, with 152 having completed five or more years.

The Labor Department recently has published some data on occupational participation rates of women and blacks, including black women, for 1974.[6] In most of the science fields, there are too few black women to obtain data. Only in the professional fields of nursing, social work, accounting and elementary teaching are data provided for black women. In these fields, black women make up 9.5% of all women accountants and 10.5% of women in elementary schoolteaching. They are 9.8% of all women in nursing and 21.7% of all women social workers. Women of all races make up 98% of the nurses, 61.3% of the social workers, 84.3% of the elementary teachers and 23.7% of the accountants.

Data from Other Sources

Some of the professional societies have collected statistical information on the participation of minority women in their profession and/or in their membership. These types of data are generally more reliable for the specific population measured than are some of the census data, but they, too, have problems. For example, statistical studies of the membership of any professional society do not provide accurate information for all persons in the profession, since many of them do not belong to the professional society or societies in their discipline. This may be more true for minority professionals than for white ones, but we have no way to know this with any certainty.

The American Chemical Society reports[7] that 1974 chemistry graduates at the baccalaureate level included 17 black women, 17 oriental women and eight Spanish American women among its 2,315 reported graduates. These data are reliable for the reporting departments, but apparently few black colleges participated in this survey. At the master's level, one black and eleven oriental women were among 308 recipients; and at the doctoral level, one black and five oriental women were among 512 reported graduates.

Among minority women registering for job search with the ACS employment clearinghouse in February 1974[8] were 13 Oriental women (one B.S., three M.S., and nine Ph.D.) and one bachelor's level Chicana.

In engineering, Fall 1973 enrollment at 148 schools included 39 black women, 24 Spanish-surnamed, 41 Asian/Oriental, one American Indian and 208 "other" minority women. This latter group is undefined. If all engineering schools had responded to this Engineering Manpower Commission survey[9] the numbers would be somewhat higher, but their proportion would still be small in a total enrollment of about 186,000 undergraduate and 34,500 full time graduate students enrolled in engineering that year.[10]

Among black twelfth graders in 1973, only 1.0% of the women indicated plans to major in engineering; 2.0% in mathematics and statistics; 0.5% in a physical science, and 1.8% in other technical fields.[11]

Social Sciences

In political science, the American Political Science Association[12] found 78 black women, two Chicano women and 15 other minority women teaching in college and university Political Science Departments in 1972-73. By 1974-75, the numbers had dropped to twelve black, three Spanish-surnamed, and six Oriental women.

In psychology, the American Psychological Association[13] identified 59 black women in the doctorate work force in 1973; thirty Oriental and three American Indian, plus 115 other minority women. At the master's level, 37 black, four Oriental and two American Indian women were identified.

Medicine

We have no statistical information on minority women in medicine. We know that in the Fall 1975 entering class in medical schools of the United states, both the number and the proportion of minorities decreased from the previous year, but we do not know how many of the minority students are women, nor whether their proportion of the class is higher or lower than in the previous year. The enrollment of women in medicine continued to increase, with women making up 23.8% of the 1975 entering class. The 1,391 minority students enrolled in the freshman class represented 9% of the total class in the fall of 1975, down from 1,473 students and ten percent of the class in the fall of 1974.[14]

Howard University estimates that 2% of practicing physicians are black, and that blacks constituted 4.5% of medical school enrollments in 1971-72. The American Medical Association reports 293 black interns and 921 black residents in medicine in 1972, but 31% of the interns and 37% of the residents were foreign graduates. We do not know how many of these were U.S. citizens, nor how many were women.

Combined ethnic minorities enrolled in 45 health professions schools in 1972-73 made up less than ten percent of each profession, and less than three percent in osteopathic and veterinary medicine.

As in all other fields of science, persons employed in the health fields at a professional level are predominately white, and except in nursing, predominately male. Dentistry shows a slowly increasing proportion of minority graduates, making up almost three percent of the 1972-73 graduates. Total minority graduate enrollment in pharmacy was 6.8% in 1973, but few data are available on more recent enrollments or on degrees granted to minorities. No information has been found that separates by sex the minority students or graduates.[15]

Summary

The statistics, then, are meager. Minority women usually are aggregated in the statistics with "women", or with "minorities" and sometimes with both, providing a double count. The data that do exist on minority women are incomplete at best, and often misleading.

Nonetheless, a few facts seem evident:

First, minority women, like majority women, are substantially underrepresented in science and engineering in proportion to their representation in the population, except for Asian Americans.

Second, the unemployment rate for Asian American women scientists and engineers at the doctoral level is appallingly high, and appears to belie the common complaint that "qualified women are not available" for science and engineering positions. This is true, as well, for majority women.

Third, more complete, more accurate and more timely data are needed as a base for developing programs to encourage minority girls to consider careers in science and engineering; to provide support as needed during their training and education, and to produce, ultimately, a critical mass of minority women scientists and engineers that is sufficiently large to provide individual role models for younger women and to demonstrate to the employers of scientists and engineers their valuable contribution to the technological enterprise. The size of the group presently is too small for either purpose, and minority women scientists and engineers are fragmented even further by being split into individual minorities and considered separately.

At present rates of increase, many years will pass before minority women scientists and engineers will exist in sufficient numbers to stimulate change. These numbers suggest that minority women must work both with other women and with minority men in seeking opportunity and presenting a united front to that vast majority of white males whose very numbers allow and encourage them to keep out and keep down any groups that appear to them to threaten either their supremacy or their security.

Minority men have advanced faster in the sciences and engineering than have all women in reaching toward salary parity, equal job opportunities and equal advancement. There are too few data to show whether minority women are generally worse off in these areas than majority women, but there is nothing to indicate that they are better off; or as well off as minority men.

SOURCE: 1970 Census, Occupational Characteristics, June 1973.

TABLE G-WF-24B

MINORITY WOMEN IN THE 1970 LABOR FORCE, BY FIELD

	Black		Amer. Indian		Asian		Hispanic	
	Coll/U Teachers	All Other	Coll/U Teachers	All Other	Coll/U Teachers	All Other	Coll/U Teacher	All Other
Chemistry	54	181	-	-	74	938	22	275
Physics	-	91	-	-	-	19	19	19
Geology	-	17	-	-	25	-	-	-
Marine Sciences	-	-	-	-	25	-	-	-
Atmos/Space Sci.	-	55	-	-	25	20	-	-
Mathematics	244	885	44	42	112	284	34	145
Engineering	76	757	-	63	-	249	36	298
Ag. Sciences	15	17	-	-	43	-	-	20
Biol. Sciences	106	641	30	17	244	355	22	129
Psychology	129	583	-	-	105	152	-	133
Economics	15	484	-	-	40	20	-	187
Sociology	132	126	-	-	19	-	-	-
Total	825	3,837	74	122	761	2,037	136	1,206

SOURCE: Characteristics of Doctoral Scientists and Engineers in the United States, 1973, Detailed Statistical Tables, Appendix B, National Science Foundation, NSF 75-312-A.

TABLE G-WF-24A

U.S. DOCTORAL SCIENTISTS & ENGINEERS BY FIELD, RACE AND SEX, 1973

FIELD	Total Both Sexes	Total Minority	Sex	Total	White/ Caucasian	Black/ Negro	Amer. Indian	Asian	Other	No Report
Total All Fields	244,921	13,282	M	223,600	194,335	1,611	103	10,164	281	17,166
			W	21,261	18,351	249	3	837	34	1,787
Phys. Sciences	53,425	3,025	M	50,939	44,347	402	14	2,327	70	3,779
			W	2,486	2,051	17	-	193	3	222
Chemists	33,881	1,902	M	31,931	28,124	358	-	1,315	45	2,089
			W	1,950	1,597	17	-	166	1	169
Physics/ Astronomy	19,544	1,124	M	19,008	16,223	44	14	1,012	25	1,690
			W	536	454	-	-	27	2	53
Math Sciences	13,515	782	M	12,523	10,680	86	-	592	25	1,140
			W	992	852	17	-	61	1	61
Mathematics	11,984	677	M	11,069	9,371	86	-	503	19	1,090
			W	915	788	17	-	51	1	58
Statisticians	1,531	105	M	1,454	1,309	-	-	89	6	50
			W	77	64	-	-	10	-	3
Computer Specialist	2,943	158	M	2,853	2,456	29	-	121	2	248
			W	90	80	-	-	3	-	4
Environmental Sci	11,074	346	M	10,767	9,614	23	-	309	4	817
			W	307	272	-	-	5	5	25
Earth Sci.	9,142	288	M	8,906	7,988	23	-	253	3	639
			W	236	209	-	-	4	5	18
Oceanographers	1,227	23	M	1,173	1,047	-	-	23	-	96
			W	54	47	-	-	-	-	7
Atmos, Sci.	705	35	M	688	572	-	-	33	1	82
			W	17	16	-	-	1	-	-
Engineers	37,569	3,322	M	37,404	31,914	86	17	3,118	76	2,193
			W	165	124	1	-	23	1	16
Life Scientists	64,540	3,443	M	56,843	49,699	505	12	2,357	76	4,194
			W	7,697	6,730	74	3	413	3	474
Biologists	41,035	2,346	M	34,821	30,188	383	10	1,494	46	2,700
			W	6,214	5,398	70	3	338	2	403
Ag. Scientists	11,893	336	M	11,718	10,488	26	2	275	13	914
			W	175	152	-	-	20	-	3
Medical Sci.	11,612	761	M	10,304	9,023	96	-	588	17	580
			W	1,308	1,180	4	-	55	1	68
Psychologist	28,286	579	M	22,509	19,968	152	12	245	12	2,134
			W	5,777	5,016	95	-	63	14	589
Social Scientists	32,773	1,616	M	29,191	25,169	319	48	1,093	33	2,529
			W	3,582	3,087	43	-	76	4	372
Economists	9,678	598	M	9,068	7,794	96	24	455	10	689
			W	610	550	5	-	6	2	47
Sociologists/ Anthropologists	7,455	364	M	6,011	5,094	96	9	193	8	611
			W	1,444	1,221	26	-	32	-	165
Other Soc. Scientists	15,640	654	M	14,112	12,281	127	15	445	15	1,229
			W	1,528	1,316	12	-	38	2	160
No Report	796	13	M	631	488	9	-	2	-	132
			W	165	139	2	-	-	-	24

FOOTNOTES

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11. Professional Women and Minorities... op. cit., p. 333.

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14. Scientific, Engineering Technical Manpower Comments, Volume 12, No. 10, December, 1975, Scientific Manpower Commission, p. 11.

15. Professional Women and Minorities... op. cit., pp. 421-422.

APPENDIX B

PARTICIPANTS

CONFERENCE OF MINORITY WOMEN SCIENTISTS
December 12-14, 1975
Airlie House, Airlie, Virginia

CHAIRPERSON

DR. JEWEL PLUMMER COBB
Dean of the College
Connecticut College
New London, Connecticut

CONFEREES

Black

DR. LILIA ANN ABRON-ROBINSON
Assistant Professor of Civil
and Bio-environmental
Engineering and Administrative Assistant to Chairman
of Civil Engineering
Howard University
Washington, D. C.

MS. GIOVANNAE DENNIS
(Electrical Engineer)
International Business Machines
San Jose, California

DR. GERALDINE PITTMAN WOODS
(Zoologist)
Consultant, National Institute
of General Medical Sciences,
National Institutes of Health
Bethesda, Maryland

DR. MARIE M. DALY
Associate Professor of
Biochemistry
Associate Professor of Medicine
Albert Einstein College of
Medicine
Yeshiva University
Bronx, New York

DR. FRANCINE ESSEIN
Assistant Professor of Biology
Department of Biological Sciences
Douglass College, Rutgers University
New Brunswick, New Jersey

MS. CECILIA SPEARING
Associate Program Director
Metabolic Biology Program
Biochemistry & Physiology Section
Directorate for Biological,
Behavioral and Social Sciences
National Science Foundation
Washington, D.C.

DR. ESTHER A. H. HOPKINS
(Chemistry)
Patent Division
Polaroid Corporation
Cambridge, Massachusetts

DR. SHIRLEY A. JACKSON
(Physics)
Research Associate
Theoretical Physics
Fermi National Accelerator Laboratory
Batavia, Illinois

DR. KATHRYN LAWSON
(Physical Chemistry)
The Sandia Corporation
Kirtland Air Force Base
Albuquerque, New Mexico

DR. RUBYE TORREY
Professor of Chemistry
Department of Chemistry
Tennessee State University
Nashville, Tennessee

DR. GLORIA HEWITT
Professor of Mathematics
Univeristy of Montana
Missoula, Montana

DR. AUDREY FORBES MANLEY
Chief of Medical Services
Assistant Professor
Departments of Pediatrics and Gynecology/Obstetrics
Family Planning Program
Emory University/Grady
Atlanta, Georgia

DR. MATILENE BERRYMAN
Associate Professor of Marine Science/Oceanography
Washington Technical Institute
Washington, D.C.

Puerto Rican

MRS. TERESA CABRERA ANZOLUT
Senior Reliability Engineer
Quality Assurance & Reliability
Con Edison Company
New York, New York

DR. S. MARIA HARDY
Associate Professor of Biology
Department of Biology
Rutgers University
State University of New Jersey
Livingston College
New Brunswick, New Jersey

DR. GRACIELA C. CANDELAS
Professor
Department of Biology
Universidad de Puerto Rico
Rio Piedras, Puerto Rico

DR. NILDA MARTINEZ
(Chemist)
International Business Machines
T. J. Watson Laboratory
Yorktown Heights, New York

MS. LAURA VIOLETA RODRIGUEZ
Associate Professor of Mathematics
State University of New York
College at Old Westbury
Old Westbury, New York

DR. HELEN RODRIGUEZ-TRIAS
Attending Pediatrician
Lincoln Hospital
Bronx, New York

Mexican-American

MS. MARIA MAGANA
(Electrical Engineer)
International Business Machines Labs
San Jose, California

DR. ELMA GONZALEZ
Assistant Professor of Biology
Department of Biology
University of California
Los Angeles, California

DR. DIANA IDA MARINEZ
Assistant Professor
Department of Natural Science
Michigan State University
East Lansing, Michigan

MS. ESTELA CASTENEDA McELRATH
(Physicist)
Staff Engineer
Hughes Aircraft Company
Culver City, California

DR. BERTHA G. TREVINO
Acting Academic Dean and Chairperson
Mathematics Department (Retired)
Laredo Junior College
Laredo, Texas

DR. MANUELA SOSA
(Dentist)
Riverside, California

Native American

MS. GLORIA KINDIG
(Mining Engineer)
Utah International
Shirley Basin, Wyoming

MS. GEORGIA PEDRO
(Environmental Engineer)
Public Health Service
Indian Hospital
Santa Fe, New Mexico

DR. AGNES N. STROUD SCHMINK
Radiobiologist
Mammalian Biology Group
University of California
Los Alamos Scientific Laboratory
Los Alamos, New Mexico

DR. JOHANNA CLEVENGER
(Psychiatrist)
Dallas, Texas

MRS. LOIS GENELL FISTER STEELE
(Medical Student)
School of Medicine
University of Minnesota
Duluth, Minnesota

CONSULTANTS

DR. RAYNA GREEN
Director - Project on Native Americans in Science
Office of Opportunities in Science
American Association for the Advancement of Science
Washington, D. C.

DR. CORA MARRETT
Department of Sociology
University of Wisconsin
Madison, Wisconsin

MS. CECILIA PRECIADO-BURCIAGA
Assistant to the President and Provost for Chicano Affairs
Stanford University
Stanford, California

AAAS STAFF

Participating in the conference

DR. JANET WELSH BROWN
Head, Office of Opportunities in Science

MRS. PAULA QUICK HALL
Project Assistant, Minority Women Scientist Conference
Office of Opportunities in Science

MS. SUSAN E. POSNER
Staff Assistant
Office of Opportunities in Science

DR. SHIRLEY MAHALEY MALCOM
Research Assistant
Bibliography of Science Education Projects for Minorities
Office of Opportunities in Science

MS. DEBBIE BAINES
Secretary
Office of Opportunities in Science

MS. CAROL ROGERS
Public Information Officer

MS. JEANETTE WEDEL
Head, Division of Developing Programs

Other OOS Staff

WAYNE SCHWANDT
Staff Assistant

JANETTE OWENS
Secretary

APPENDIX C

ORGANIZATION OF THE CONFERENCE

The size of the conference was limited in advance to thirty, and was open only to invited participants. The planners wanted the group to be large enough to represent diversity of experience, and small enough for the conferees to interact on a one-to-one basis within a two-day conference. To be included were those minority groups in the United States which are numerically underrepresented in the sciences: Blacks, Mexican-Americans, Native Americans, and Puerto Ricans. The organizers did not seek a representation of those groups proportionate to their numbers in science but did seek to have each group sufficiently well represented that different viewpoints might be expressed and that no single group would seem to dominate.

The conference was aimed at minority women in mathematics, the biological and physical sciences, and in those applied sciences such as engineering and medicine that require substantial training in the sciences and mathematics. It was expected also that most invitees would hold earned doctoral degrees, except in engineering where the B.S. or M.S. is the more usual credential for a professional engineer, but no particular length or kind of experience was required. On the contrary, the conference staff sought as broad a kind of experience as possible and welcomed nomination of women at various stages in their careers. They sought nomination of women who are or have been employed in government, private industry and educational institutions, and some who are self-employed. They wanted women who were familiar with different types and levels of employment. Among the conference participants, the organizers sought to have women who had been trained at different kinds of institutions where their training would have been obtained with various kinds of financial support.

Nominations were received from many different sources. More than 150 letters requesting nominations were sent to colleagues requesting that they nominate for participation in the conference minority women scientists whom they considered would make a substantial contribution to the attainment of the conference objectives. Among those contacted were members of the Committee on Opportunities in Science of the AAAS, the minority and women advisory panels of this office, members of minority and women's science organizations, members of minority social, cultural and political organizations, and the Migration Division, Department of Labor for the Commonwealth of Puerto Rico. The conference chairperson and consultants also provided nominations of several prospective conferees. The requests for nominations were accompanied by a one-page description of the project and a summary of the range of characteristics to be considered in selection of conferees.

Approximately two hundred women were nominated. The total number is surprisingly high considering the tight time constraints under which nominators were asked to respond and the fact that the verifiable number of doctoral level minority women scientists is thought to be less than 300.

The conference staff were able to identify a wide variety of Black candidates almost immediately. It took somewhat longer to get nominations of Puerto Rican candidates. Locating Mexican-American prospective conferees was difficult, and identifying Native American women scientists even more so. The greater numbers of Black people in this country and the availability of established communication channels, such as Black scientific societies and colleges, made a difference. The nominees themselves provided the names of many of their colleagues, thus expanding the nominee pool. There were approximately one hundred and four Black, thirty-nine Mexican-American, twenty-five Native American and twenty-seven Puerto Rican nominees.* The candidates varied in their level of education although most had graduate degrees. A few were in professions such as veterinary medicine and pharmacology, not specifically included in this project. The Native American and the Mexican-American nominees were generally younger, while a wider age span was represented in the Black and Puerto Rican groups. Geographically the nominees were from every region of the country including Alaska and Puerto Rico. The Native American nominees were for the most part located in the western-coastal, southern and plains states. The Mexican-Americans were often in the Southwest. Puerto Rican nominees were concentrated in New York or Puerto Rico and a few in Chicago. The Blacks, while more scattered than the other groups, had larger numbers in the southeastern/east coast regions.

Each nominee was asked to submit a curriculum vita if she wished to be considered for participation in the conference. Several nominees were contacted by phone to get additional information. As the vitae were received, they were separated by racial or ethnic group and within the groups by discipline of the nominees. Efforts were made to select within each minority group someone from each field. This was not always possible, given the actual distribution of minority women in the sciences and the very short notice many nominees received.

Some of the nominees indicated that they identified more strongly with the dominant culture than with the minority groups of their origin. Some of these women expressed the sentiment that minority group status had little bearing on their lives and careers. This was a very small group, not more than five of those who contacted the project, and their lack of interest in the conference and their perception of themselves within society caused their candidacy to be considered less favorably in the selection process.

Conference staff, in consultation with the chairperson and consultants, reviewed the biographical data and letters of nomination for each minority group by discipline. The most appropriate candidates according to the conference selection criteria were separated from the group and held for comparison with nominees of other racial or ethnic groups. In some instances, the choice between two nominees was based on the availability or lack thereof of candidates in their field of another minority group. For instance, it was not possible to find six Native Americans in appropriate disciplines who were available to attend the conference on short notice. It was not possible, therefore, to substitute an engineer or physician of another race for the Native American engineers or physicians because there were no Native Americans in other disciplines who could attend with whom to replace them. An attempt was made to represent various types of work experience and employers in each ethnic or racial group and in each discipline, although it was not always possible to achieve this mix within disciplines. For example, all the physical scientists are employed in private industry. In summary, this group of invited participants represents collectively the widest range of characteristics among minority women scientists who were available to attend this conference.

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*More than two hundred Puerto Rican women scientists and students in Puerto Rico were identified, though not individually nominated for the conference, by Ms. Dolores R. Colon, Grant Coordinator of the Fundacion Educativa Ana G. Mendez in Puerto Rico.

The final selection was made by conference staff on the basis of the choices described above. The process seems to have worked well and provided a broadly experienced and highly diversified group of conferees. If the selection were biased in any respect, it was biased in favor of diversity. It is possible that by looking for breadth of experience in so small a group, the arrangers selected conferees who were more than typically mobile and perhaps unusually self-confident. The "average" minority woman scientist may well be more isolated and less mobile than the conferees.

The thirty conferees were drawn from racial or ethnic groups as follows: thirteen Blacks, six Mexican-Americans, five Native Americans and six Puerto Ricans. Fourteen are presently employed in universities, seven in industry, three each in government or research institutions, two are privately employed, and one works in a hospital. Their distribution by field is as follows:

Biological Sciences		9
	Biology	7
	Zoology	1
	Biochemistry	1
Engineering		6
Physical Sciences		7
	Chemistry	4
	Physics	2
	Ocenography	1
Medical and Dental Professions		5
	Pediatrics	1
	Pediatrics and OB-GYN	1
	Dentistry	1
	Psychiatry	1
	Medical Student	1
Mathematics		3

The selection could not have been accomplished at all if it were not for the enthusiastic support and cooperation of nominators, nominees and invitees. The period of preparation for the conference was a short six weeks from the time of award to the holding of the conference. The conferees themselves had only two weeks notice, but fewer than ten of the women selected were unable to participate on the dates planned. Many of the conferees rearranged their schedules to accommodate the conference dates.

A preconference inquiry was made of all nominees and invitees to determine the agenda for the meeting. All nominees, including those selected, were sent a letter asking them to describe their experience and observations on three levels: (1) the years prior to college in terms of family, school and community influences; (2) the collegiate and professional education including a comparison with peers of the same gender and those of the same race or ethnic group; and (3) the career experience. They were asked, in addition, what programs and/or strategies they would recommend to encourage young minority women to consider science careers. Nominees were specifically asked to identify factors or forces which helped or hindered their pursuit of science careers. This information was useful in preparing the tentative agenda and briefing discussion leaders. The information provided by the nominees who were selected for the conference (which does not differ substantially from the reports of other nominees) was used in the preparation of the profile of conferees (Appendix D). These same discussion items were the basis of the agenda.

A tentative schedule and agenda follow. The schedule was closely followed, except that the sessions frequently went longer than planned, discussion continued through meals, and the participants never took the breaks scheduled for them. The participants were divided into small discussion groups by the staff in such a way that each participant met with every other one at least once during the conference. They were also selected so that there was a mix of racial or ethnic groups, fields and levels of experience in each small group. This maximized the amount that conferees learned about each other. In the fourth group of sessions each minority group met by itself, though there had been informal caucuses before that point. One of the longest plenary sessions was that in which the minority groups spoke with each other about their different perceptions. On Sunday morning when the recommendations were being drafted, the participants divided according to their primary interests, that is, one worked on broad policy recommendations, one on recommendations to private industry, one in higher education and one on recommendations for the pre-collegiate years. The draft recommendations from each of these groups were then discussed by all participants in the final plenary until a concensus had been reached on each.

Conference of Minority Women Scientists

Airlie House, Warrenton, Virginia
December 12 - 14, 1975

TENTATIVE SCHEDULE AND AGENDA

(The time of sessions and meals listed below are quite firm, but the topics for discussion and the order of substantive sessions are strictly tentative. Changes may be made between now and the conference on the basis of suggestions still coming in, and even after the conference has started if the participants wish.)

FRIDAY, DEC 12

4:00 - 5:00 p.m.	Registration and Refreshments
5:00 - 6:30 p.m.	Plenary Session I Welcome and Introductory Remarks -- Dr. Jewel Plummer Cobb, Conference Chairperson Introduction of Participants - Each participant will introduce herself and briefly state the matters she thinks most important for the conference to address.
6:30 - 8:00 p.m.	Dinner (Introduction of Participants will continue through dinner if necessary.)
[8:00 p.m.	Discussion leaders and rapporteurs will meet.]
8:30 - 10:30 p.m.	Discussion Groups - Session I - Precollegiate Background and Experience Four small discussion groups will analyze their own early motivation for science, engineering, dentistry, and medicine, and identify both positive and negative factors influencing their decisions.
[10:30 p.m.	Discussion leaders and rapporteurs will meet.]

SATURDAY, DEC 13

8:00 a.m.	Breakfast
9:00 - 9:30 a.m.	Plenary Session II Report on main points emerging from discussion groups of previous evening Agenda and arrangements for the morning session.

9:30 a.m. - 12:30 p.m.	Discussion Groups - Session II - Collegiate and Professional Education Four small discussion groups will examine obstacles and encouragement encountered during college and graduate or professional education. (Grouping will be assigned on a random basis at first, and after a mid-morning break reassigned by field or profession, if that is thought to be useful.)
12:30 p.m.	Lunch [Discussion leaders and rapporteurs will meet.]
2:00 - 2:30 p.m.	Plenary Session III Report of highlights from second session of discussion groups. Agenda and arrangements for afternoon session.
2:30 - 5:30 p.m.	Discussion Groups - Session III - Working Experience Small discussion groups will examine the advantages and problems encountered by minority women scientists on the job as teachers, researchers, practicioners and administrators, in order to identify conditions, attitudes and arrangements that have helped or hindered their work and development as scientists. (Again, groupings will initially be assigned on a random basis, and perhaps reassigned according to types of careers or employing institutions halfway through the afternoon.)
5:30 p.m.	Sherry Hour
6:30 p.m.	Dinner
[7:30 p.m.	Discussion leaders and rapporteurs will meet.]
8:00 - 9:30 p.m.	Discussion Groups - Session IV - Separate Minority Groups Each of the four minority groups represented at the conference will meet separately to review how the many factors discussed in previous discussions differ for members of their own ethnic or racial group, and to identify the ways in which the situation is unique for them as Blacks, Mexican-Americans, Native Americans or Puerto Ricans.
9:30 p.m.	Plenary Session IV The four minority groups will share their separate perspectives with each other.
[10:30 p.m.	Discussion leaders and rapporteurs will meet.]

SUNDAY, DEC 14

8:00 a.m.	Breakfast
9:00 a.m.	Plenary Session V Summary of findings of previous sessions. Organization of working groups to draft conclusions and recommendations.
9:30 a.m. - 12:30 p.m.	Working Group Meetings Conferees will organize around their particular interests and draft recommendations.
12:30 p.m.	Lunch
2:00 - 4:00 p.m.	Plenary Session VI Review of draft conclusions and draft recommendations by the whole conference. Adoption of conclusions and recommendations.
4:00 p.m.	Adjournment
[4:00 - 6:00 p.m.	Discussion leaders and rapporteurs will meet.]

APPENDIX D

AN ECONOMIC AND SOCIAL PROFILE OF THE CONFEREES

A short written inquiry into their background was made of the minority women scientists at the conference. There follows a summary of the data gathered, supplemented by information communicated verbally by the participants. It must be understood that this is not a scientifically representative sample; no statistical significance is attributed to the data, so one cannot generalize from it about all minority women scientists. It does, however, give a profile of the participants and may help to dispel some notions, for example, regarding class background.

The group selected to participate in the conference were chosen for the diversity of their experiences and noteworthiness of accomplishments in their respective fields, but they had some things in common in addition to their being minority women scientists. One of the most startling attributes observed was their tendency to underestimate their accomplishments as well as the obstacles they had encountered. They made frequent references to "chance" and "luck" which, in the eyes of the staff and consultants, had very little to do with their achievements.

The table below shows the age distribution of the conferees by ethnic group. Approximately half of the conferees were "middle children". There were ten "first or only", and six "youngest" among siblings.

Conferees were asked to estimate their family income during their precollegiate years relative first to other families within their communities, and second to the "average American" family. Eighteen of the thirty participants estimated their family incomes to be below national average; only one judged hers to be higher than the average. In comparison to other community members, twelve estimated their family incomes below average; half as many thought it above the community average. Four of the five Native Americans and five of the six Mexican Americans viewed their families as lower in income than most community members.

Several reported being the first or only member of their family to achieve the level of education and professional status they had. There appeared to be no recognizable pattern in the amount of education received by conferees' parents. There were parents with as little as six months formal education and as much as doctoral degrees. Several conferees with less educated parents recalled their parents' frustration at their inability to help with difficult school work. A zoologist whose parents, although successful in business, had no more than eight years formal education each, reported that they paid a tutor to help her since they were unable to do so. The mothers of the participants were all in traditional occupations; more than three-fourths of them worked outside their own homes during some period of their lives.

Only one of the Puerto Rican women was born on the U.S. mainland; the other five, born in Puerto Rico, have spent varying amounts of time in New York and other mainland cities. Only one of the Puerto Rican conferees now lives and works primarily in Puerto Rico. Conference organizers deliberately selected Puerto Rican scientists who had had some experience on the mainland so that they could also relate to the issue of minority group status.

Most of the Black women were reared in cities in the southeast or on the east coast. Three of the thirteen participants had spent some part of their childhood on a farm, in a small town, or suburban area.

Both the Mexican-American and Native American conferees were reared in the southwest on ranches, farms, or reservations, or in small towns. There were socio-cultural differences among Mexican-Americans from various sections of the southwest. The Native American women stressed their tribal identities although there are many cultural elements and values shared among the tribes.

Age Distribution of Conferees

Years of Age	Native American	Mexican-American	Puerto Rican	Black	Total
20-30	2	1	1	3	7
31-40	2	3	1	2	8
41-50	0	0	3	5	8
51-60	1	0	1	3	5
60-up	0	1	0	0	1
Total	5	5*	6	13	29

*One not reporting

APPENDIX E

SELECTED RESOURCES ON MINORITIES AND WOMEN IN SCIENCE

MANPOWER DATA, GENERAL

American Chemical Society. 1975 Report of Chemists' Salaries and Employment Status. Washington, DC: American Chemical Society, 1975.

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Burnett, Elfrida L. "Doctor's Degrees Conferred by All U.S. Institutions, by State, Academic Field, Sex, and Institution, 1961-62 Through 1970-71." Washington, DC: U.S. Department of Health, Education and Welfare, Office of Education, January 1973.

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Jay, James M. "Black PhD's -- Letter to the Editor." Science 190 (28 November 1975).

Kistiakowsky, Vera. "Women in Engineering, Medicine and Science." Paper prepared for the Conference on Women in Science and Engineering, National Research Council, June 11-12, 1973.

McCarthy, Joseph L., and Wolfle, Dael. "Doctorates Granted to Women and Minority Group Members." Science 189 (12 September 1975): 856-859.

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Wilburn, Adolph Y. "Careers in Science and Engineering for Black Americans." *Science* 184 (14 June 1974): 1148-1154.

Winkler, Karen J. "Black Youth's Share of Enrollment Grows." *Chronicle of Higher Education*, 15 December 1975, p.14.

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Bryant, Willa C. "Discrimination Against Women in General: Black Southern Women in Particular." *Civil Rights Digest*, Summer 1971, pp.10-11.

Galloway, Sylvia. "Black Women in Higher Education." *Comment* 9 (Fall 1975):2.

King, Lourdes Miranda. "Puertorriquenas in the United States." *Civil Rights Digest*, Spring 1974, pp.20-27.

Nieto, Consuelo. "Chicanas and the Women's Rights Movement." *Civil Rights Digest*, Spring 1974, pp.36-42.

Rickman, Geraldine. "A Natural Alliance." *Civil Rights Digest*, Spring 1974, pp.57-65.

Witt, Shirley Hill. "Native Women Today." *Civil Rights Digest*, Spring 1974, pp.29-35.

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Committee on Minorities in Engineering. Washington, DC: Assembly of Engineering, National Research Council.

Fermi National Accelerator Laboratory. *Proceedings of the Minority Physics Conference, November 7-8, 1974*. Batavia, IL: Fermi National Accelerator Laboratory.

Planning Commission for Expanding Minority Opportunities in Engineering. Minorities in Engineering: A Blueprint for Action. New York: The Sloan Foundation, 1974.

Wilburn, Adolph Y. "The Status of Minorities in the Scientific Employment: The Case of Black Americans." Paper presented at the meeting of the American Association for the Advancement of Science, Washington, DC, 28 December 1972.

Winston, Michael. "Through the Back Door: Academic Racism and the Negro Scholar in Historical Perspective." Daedalus, Summer 1971, pp.678-719.

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"Women in Science." Mosaic, November/December 1975, pp.8-13.

REPORTS ON THE STATUS OF WOMEN IN PROFESSIONAL ASSOCIATIONS

The following is a list of reports from the committees and commissions on the status of women indifferent scientific and technical professional associations. The associations often have other material on the topic.

ANTHROPOLOGY: "Statistical Data Regarding the Occupational Status of Women in Departments of Anthropology, 1973-74"
American Anthropological Association
1703 New Hampshire Avenue, NW
Washington, D.C. 20009

ARCHITECTURE: "Status of Women in the Architectural Profession", February 1975
American Institute of Architects
1735 New York Avenue, NW
Washington, D.C. 20006

ASTRONOMY: "Report to the Council of the AAS from the Working Group on the Status of Women in Astronomy, 1973"
American Astronomical Society
211 FitzRandolph Road
Princeton, New Jersey 08540

CHEMISTRY: "Women in Chemistry Faculties of Institutions Granting the PhD in Chemistry," July 1974
American Chemical Society
1155 16th Street, NW
Washington, D.C. 20036

ECONOMICS: "Committee on the Status of Women Annual Report, May 1974"
American Economic Association
1313 21st Avenue South
Nashville, Tennessee 37212

ENGINEERING: "A Profile of the Women Engineer," June 1972
Society of Women Engineers
345 East 47th Street
New York New York 10017

GEOSCIENCES: "Women in Geoscience," September 1972
American Geological Institute
5205 Leesburg Pike
Falls Church, Virginia 22041

IMMUNOLOGY: "Women Members in the AAI, 1963-1974"
American Association of Immunologists
9650 Rockville Pike
Bethesda, Maryland 20014

HISTORY OF SCIENCE: "Report of the Committee on Women in History of Science," December 1973
History of Science Society
School of Physics and Astronomy
University of Minnesota
Minneapolis, Minnesota 55455

MATHEMATICS: "Women in Mathematics," April 1973
American Mathematical Society
Box 6248
Providence, Rhode Island 02904

MEDICINE: "Statistics on Women in Medicine," 1972
American Medical Women's Association
1740 Broadway
New York, New York 10019

METEOROLOGY: "Women in Meteorology," December 1973
American Meteorological Society
45 Beacon Street
Boston, Massachusetts 02108

MICROBIOLOGY: "Status of Women Microbiologists," 1974
American Society for Microbiology
1913 Eye Street, N.W.
Washington, D.C. 20006

PHYSICS: "Women in Physics", 1972
American Physical Society
335 East 45th Street
New York, New York 10017

PHARMACY: "Women in Pharmacy," February 1974
American Pharmaceutical Association
2215 Constitution Avenue, N.W.
Washington, D.C. 20037

POLITICAL SCIENCE: "Report of the Committee on the Status of Women in the Profession, 1969-75"
American Political Science Association
1527 New Hampshire Avenue, NW
Washington, D.C. 20036

PSYCHOLOGY: "Report of the Task Force on the Status of Women in Psychology," July 1973
American Psychological Association
1200 17th Street, N.W.
Washington, D.C. 20036

SOCIOLOGY: "The Status of Women in Sociology, 1968-72"
American Sociological Association
1722 N Street, N.W.
Washington, D.C. 20036

Prepared by Susan E. Posner

Founded in 1848, AAAS is the world's leading general scientific society with about 120,000 individual members interested in the advancement of science, in improving the effectiveness of science in promoting human welfare, and in increasing the public understanding and appreciation of science. Through its nearly 300 affiliated societies and academies covering the entire spectrum of science and technology, AAAS has a significant relationship with about 2 million individuals directly involved in science and technology. This relationship together with the broad scope of its interests has uniquely equipped AAAS to exercise a leadership position in convening expert bodies to analyze the technological, social, and political ingredients in significant problems facing society.

American Association for
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AAAS Activities and Programs

- **Science**—the weekly news magazine of science, received by 150,000 individuals and institutions worldwide, contains definitive articles and reports by scientists, engineers, and others on topical developments in the sciences, as well as on matters of public interest which involve the broad scientific community.
- **Annual National Meeting**—consists of many symposia and lectures which present the recent developments in and applications of science, as well as far-reaching discussions of the relationship between science and the problems of and prospects for society.
- **Public Information**—supplies reliable reports to the news media on the latest developments in science and science-related public policy issues from materials published in *Science*, papers presented at the Annual Meeting (covered by more than 500 reporters and science writers), and results derived from the various AAAS programs.
- **Public Understanding of Science**—develops programs to improve the quality of science presentations in the media and conducts seminars on crucial issues relating to science and technology in cooperation with community organizations throughout the country.
- **Public Policy**—sponsored authoritative studies of such problems as herbicide assessment, energy use, and air conservation, and is helping to develop seminars for members of Congress and their key staff aides and for science attachés of foreign embassies, and also sponsors a program for Congressional Fellows in science and engineering.
- **International Programs**—aids in the exchange of ideas and individuals through scientific groups in Latin America, Africa, Asia, the USSR, and the United Kingdom; also coordinates various activities and prepares reports on problems of international concern, such as population, women in development, and Habitat.
- **Science Education**—prepares guidelines for and conducts programs in teacher education; develops and publishes precollege and college level science-education materials; and conducts short courses for college teachers.
- **Opportunities in Science**—helps to coordinate programs of AAAS and its affiliated societies to improve the educational and professional opportunities in science for minorities, women, and handicapped persons.
- **Publications**—*Science Books & Films*, *Science Book List; Science* compendia on energy, population, food, and others to come; audiotape cassette albums on energy, origins, cancer, the physical world, and others.